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Assessing the Effectiveness of an Intervention to Improve Analysis And Use of Vaccine Preventable Disease Surveillance Information in Georgia

December 2005

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- ▲ *Implementation of appropriate health system reform.*
- ▲ *Generation of new financing for health care, as well as more effective use of existing funds.*
- ▲ *Design and implementation of health information systems for disease surveillance.*
- ▲ *Delivery of quality services by health workers.*
- ▲ *Availability and appropriate use of health commodities.*

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Abstract

It is widely recognized that the analysis and use of information for decision making are essential components of a functioning infectious disease surveillance and response (IDSR) system. Unfortunately, in many countries, the analysis and response components are extremely weak, and contribute to the fact that IDSR systems are not functioning optimally. In Georgia, PHR*plus* is currently working with government counterparts at the national and local levels to strengthen vaccine preventable disease prevention and control activities through the dissemination of guidelines, improved tools, and capacity building at the rayon level. The primary objectives of this operations research study are: 1) to document the implementation and effectiveness of the surveillance strengthening intervention package in promoting desired analysis and response at the rayon level; and 2) to provide an in-depth assessment and description of how individual- and system-level factors affect the effectiveness and success of the job aid intervention package. Data for the study come from baseline and follow-up surveys of rayon (district) health workers, record reviews, and focus-group discussions. The results suggest that many expected improvements in analysis and response did occur following implementation of the intervention package, and that measured improvements in analysis and response were attributable to the package; however, there also exist barriers that operate at the health systems level that adversely affected the effectiveness of the intervention in influencing the availability of data, analysis, and response.

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Acronyms

CPH	Center for Public Health
CIF	Curatio International Foundation
DPH	Department of Public Health
FGD	Focus Group Discussion
IDSR	Infectious Disease Surveillance and Response
NCDC	National Center for Disease Control
PHR<i>plus</i>	Partners for Health Reform <i>plus</i> Project
VPD	Vaccine Preventable Disease

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Executive Summary

It is widely recognized that the analysis and use of information for decision making are essential components of a functioning infectious disease surveillance and response (IDSR) system. Analysis and response can be defined as the process of analyzing epidemiologic and programmatic data, interpreting results, and using these results to help guide decisions on planning and implementing infectious disease interventions and responses, improving existing IDSR activities, and allocating resources. At the local level, the process of analysis and response should be driven by the program manager's desire to use IDSR data to improve decision making. In order for this to occur, surveillance information must be perceived as useful for decision making, and expectations for analysis, interpretation, and translation into action must be clearly laid out. If the decision maker is not the same as the analyst, then the results of the analysis must be summarized and disseminated in timely and standardized formats which make them useful to decision makers.

Unfortunately, in many countries, the analysis and response components are extremely weak, and contribute to the fact that IDSR systems are not functioning optimally. For example, skills in data analysis, data interpretation, and the use of data for decision making are often very limited at the district level. This limited capacity affects the timeliness and adequacy of response, thereby impeding the effectiveness of the surveillance system. In addition, there has been little assessment at the rayon level of the availability and quality of data produced by the IDSR system. As a result, key operational problems have not been readily identified and remedied on a routine basis. Moreover, the scientific literature on how to strengthen health information systems in low- and middle-income countries is extremely scanty. In fact, we are not aware of any previous systematic evaluations of the effectiveness of IDSR strengthening initiatives on the analysis and use of routinely-collected surveillance data.

In Georgia, PHR*plus* is currently working with government counterparts at the national and local levels to strengthen vaccine preventable disease prevention and control activities through the dissemination of guidelines, improved tools, and capacity building at the rayon level. One key intervention, as part of a broad package of interventions supported by PHR*plus*, has been the introduction of a tool, or job aid, aimed at standardizing and facilitating IDSR analysis and its translation into public health action (response). Additionally, it provides components for identifying epidemiological, as well as operational, aspects of IDSR analysis and response that are insufficient, as well as a format for specifying actions to be taken to remedy such insufficiencies.

There are two primary objectives of this operations research study: 1) to document the implementation and effectiveness of the surveillance strengthening intervention package in promoting desired analysis and response at the rayon level; and 2) to provide an in-depth assessment and description of how individual- and system-level factors affect the effectiveness and success of the job aid intervention package. The first operations research objective, the evaluation of the intervention package, was accomplished primarily with the implementation of a survey questionnaire focusing on issues of analysis and response among individuals working at rayon-level centers of public health (CPHs) who are responsible for analysis and response of vaccine preventable disease (VPD) data. A baseline and two follow-up surveys were administered. These data were supplemented by record

reviews of completed intervention job aid workbooks as well as focus group/in-depth interviews among the CPH staff at various levels.

The intervention that was evaluated aimed to improve analysis and response by clarifying roles and responsibilities at the rayon level for analysis and outlining links to actions, by improving capacity, and by ensuring the resources necessary for the non-personnel costs of outbreak investigation and selected monitoring functions. It was hoped that all of these efforts would improve the value that workers place on VPD surveillance information, and as a result, the motivation for evidence-based decision making.

The overall intervention that was assessed consists of several components developed and initiated by *PHRplus*, which includes: the development and introduction of surveillance guidelines for rayon-level public health managers along with a surveillance handbook for health facility staff, a job aid for rayon CPHs, training in the guidelines for both rayon CPH and facility staff and on-the-job technical assistance on an as-needed basis, and development of respective surveillance financial standards and financial assistance for selected analysis and response functions. The intervention package was uniformly implemented throughout all 12 rayons of the Imereti region of Georgia.

The following are the specific research questions and major findings of the study:

Was the job aid intervention package successfully implemented, and did it function as intended? The results of both the quantitative survey and the record review show that the intervention was successfully implemented within each of the 12 CPH rayon offices in the intervention region of Imereti. This was evident by the fact that: 1) all rayons had received the surveillance guidelines and job aid; 2) both the guidelines and job aid were readily available; 3) staff from each of the 12 CPH offices had participated in basic training in the use of the surveillance guidelines; 4) almost all CPH staff reported they knew how to use the workbook; and 5) project records showed that the financial standards system described was implemented as planned. The workbook was revised between follow-up 1 and 2. While the revised workbook was available in all 12 rayons, according to the record review, only half were found to be using the revised version at follow-up 2, with the remaining half using the previous version.

The questionnaire showed that by follow-up 2, all (100 percent) respondents within the intervention rayons agreed that: 1) there are written guidelines to help guide the analysis of the surveillance data; 2) there are written guidelines to help identify problems with health facilities with prevention and control of VPD; and 3) there are written guidelines to help specify solutions for problems with health facilities in the prevention and control of VPDs. Furthermore, the two primary indicators for measuring successful implementation of the intervention package, in relation to baseline conditions, showed there was a significant increase between baseline and follow-up 2 in: 1) the proportion of CPH staff that agreed there are written guidelines to help guide the analysis of the surveillance data; and 2) the proportion of CPH staff that agree there are written guidelines to help make use of surveillance data.

Did the expected improvements in analysis and response occur after implementation of the job aid intervention package? There is substantial evidence from the survey questionnaire, record review, and focus group discussions (FGDs) that many expected improvements in analysis and response did occur following implementation of the intervention package. First, the survey results showed a marked increase from baseline in the perceived availability of quality surveillance data by CPH staff. This was largely substantiated by the FGDs where CPH heads and staff epidemiologists stressed that completeness, timeliness, and accuracy of data from subordinate health facilities had significantly improved since the introduction of the intervention package.

Second, the questionnaire showed a marked increase from baseline in the proportion of CPH staff who perceived themselves capable of performing analysis of surveillance data. This was largely substantiated by the FPDs by the fact that CPH epidemiologists cited that there has been improved understanding of their roles, job functions, and regulations since the introduction of the intervention package. Furthermore, CPH directors cited that they perceive CPH epidemiologists to have improved their analytic skills since the introduction of the intervention package.

Third, the questionnaire showed a marked increase from baseline in the level of self-reported CPH staff motivation to analyze surveillance data since baseline. The FGDs again largely affirm these results. Many epidemiologists explained in the focus group discussion that, prior to the intervention, their motivation to analyze surveillance data was low, and that since then, their motivation for such tasks has increased.

Lastly, there was a modest increase in the level of self-reported motivation by CPH staff to use analyzed surveillance data since baseline. Furthermore, the record review showed that analyzed data were being used since the introduction of the intervention package, with 9 of 12 CPH representatives able to show statistical reports that were generated, and 10 of 12 showing analytical reports on the epidemiological situation, performance, planning, and/or implementation actions undertaken as a result of the workbook. However, while the questionnaire showed that the perceived value CPH staff placed on using analyzed surveillance data was very high at baseline and continued that way over both follow-up survey rounds, this high value did not necessarily translate into action (conducting all IDSR activities in a timely and accurate manner). According to the CPH heads and staff epidemiologists, the general use of surveillance data and analysis for planning and decision making is limited, although self-reported survey measures for using surveillance information for a number of types of actions were high. Furthermore, motivation to use analyzed data appeared to be tempered by the following barriers: limited availability of resources to carry out surveillance response, deterioration of public health functions as a result of health care reform, and limited priority placed on VPD surveillance by local governments.

Despite these improvements, the results of the record review suggest that the workbook was not used to its fullest extent for data analysis and evidence-based decision making (use). This was evident by the fact that on average, nearly a quarter (22.5 percent) of the workbook sections focused on data aggregation (analysis) were not completed in 2004, and 50 percent, on average, were not completed accurately in 2004. Furthermore, the record review showed that the majority (64.2 percent) of the workbook sections focused on data use, as defined by making data-driven recommendations, were not completed in 2004, despite the fact that, during this period, all districts were experiencing a measles outbreak. While there may have been sufficient training in basic surveillance and epidemiology, additional training in using the workbooks for analysis and evidence-based decision making may be in order.

The results from respondents from the control areas also warrant attention, as it is interesting to note that the baseline values for some indicators on staff perceptions were found to be higher, on average, among control respondents than among intervention respondents. For example, control respondents were more likely to agree with the statements that there are written guidelines available to help guide the analysis of surveillance data and to identify problems and solutions at the health facility level, and they have sufficient capacity to perform analysis and response of surveillance data. One explanation for these findings is that, prior to the baseline survey, selected CPH staff in the intervention areas participated in a training session on epidemiology and health information systems. This may have led to intervention participants to realize that the guidelines that they were using at the time were inadequate compared to the guidelines that were introduced as part of the intervention, and that they did not have the sufficient skills necessary to conduct data analysis. This explanation is

supported by the results of the FGDs, in which some participants explained that, prior to the intervention, the available guidelines were not helpful in carrying out data analysis, that their data analysis skills were very limited, and that the types of analysis that were conducted were often superficial. It is also interesting to note that, among control respondents, the outcome levels of many of the outcome indicators measured with the survey data decreased over time. The explanation is unclear, but one possibility is that the respondents realized that they did not have the guidelines and skills necessary to carry out all the functions that were brought up in the questionnaire.

To what extent did the package of interventions contribute to resultant improvements in analysis and response? There is evidence to suggest that at least some of the improvements in analysis and response observed within the intervention rayons were attributable to the intervention package. Such program attribution to improvements in outcome indicators was tested by the use of a pre-post quasi-experimental design. Using this method, program impact was assessed by desired improvements in specified outcome indicators among the intervention group in relation to the control group, which showed what would have happened had the intervention package not been implemented. In this way, impact was assessed using linear regression, with the covariate of interest being the interaction term between treatment groups (intervention vs. control) and study time points (baseline vs. follow-up 2).

For all impact outcome indicators, all coefficients were in desired directions indicating that the improvements in respective aspects of analysis and response, as measured by the mean Likert scale scores, were greater in the intervention rayons than in the control rayons. Overall, the evaluation showed the intervention package to have had a substantial impact on improving analysis of surveillance data, while having only a very limited impact on use of surveillance data. The intervention package was shown to have had a significant impact ($P < 0.05$) on two areas of analysis in particular, perceived capacity to perform analysis and motivation to perform analysis. Additionally, the intervention package was shown to have had a marginally significant impact ($P = 0.09$) on the perceived availability of quality surveillance data. However, statistical analyses showed no significant impact of the intervention package on the two aspects of data use that were measured, perceived value of using analyzed surveillance data and perceived motivation to use analyzed surveillance data, which may be explained partially by the fact that their values were already high at the time of the baseline survey.

The results of the FGDs of CPH and health care facility staff point to a number of factors that help explain the degree of above-mentioned rayon-level improvements in the intervention area. First, respondents mentioned that specific components of the intervention – the continuous trainings and technical assistance and availability of the guidelines – led to improved knowledge about current regulations at both the local and health facility levels, clarification of the roles and responsibilities of staff at regional, rayon, and health facility levels, and as a result, improved availability and analysis of data. The workbook was also mentioned as a factor that helped clarify the types of analysis that should be carried out, and how the analyzed data should be used for epidemiological and programmatic response. At the same time, CPH staff directors claimed that more training in analytical skills was needed, especially for newly hired staff. Second, many staff at both the CPH and health facility level, described that the intervention has led to an increased sense of job responsibility regarding their role in the surveillance system, and as a result, better performance. That the CPH at the regional and local level were paying greater attention to surveillance data was mentioned as a reason for the improvements in data availability and analysis. Third, the financial standards component of the intervention, which provided a new source of financing for CPH staff to investigate outbreaks and to monitor subordinate CPH offices and health care facilities, was mentioned as a factor that increased the ability of CPH staff to carry out critical surveillance functions. Prior to the intervention, the non-personnel costs of outbreak investigations and monitoring were largely

unfunded, a legacy of health reforms that were initiated in 1995. Finally, two factors outside the scope of the intervention may also have played a role in the improvements: 1) increased staff motivation that resulted from the regularity of the payments of salaries in 2004 compared to the situation in 2003, a year in which there were many months when CPH and health facilities staff did not receive payments and 2) the measles epidemic that occurred during much of 2004.

Despite these improvements, the FGDs with CPH staff highlight several potential barriers to using the intervention tools to their fullest extent for analysis and response. First, while the situation has improved, CPH staff still cited there was insufficient availability of quality surveillance data from subordinate health facilities. The unavailability of phones and electricity in health facilities and CPH offices, low levels of health care utilization, and poor reporting of data from some private providers also play a role in limiting the availability and quality of surveillance data. Second, there appears to be a common perception that even if surveillance data are analyzed (or aggregated), they will likely not be used by those at higher levels. Third, the CPH staff frequently expressed the fact that they had no authority to impose penalties on low-performing health facilities, no matter how poorly they carried out their surveillance duties. Fourth, limitations of government resources to carry out surveillance responses was frequently cited as a reason for why analysis is not used to carry out prevention and control responses. And lastly, low salaries were cited as a reason why some CPH staff were not always motivated to perform their surveillance tasks adequately.

All of these factors suggest that, although the intervention package was implemented successfully, external factors, particularly those that operate at the health systems level, played an important role in limiting its effectiveness in enhancing data analysis and response. A large part of the problem is that accountability relationships within Georgia's health system are often weak. For example, the health reforms that were carried out in the 1990s resulted in fragmentation between health care facilities and CPH offices and a lack of clarity about who is financially responsible for some key functions of the surveillance and response system, such as outbreak investigations. In order to address the health systems factors that act as barriers in Georgia, it will be critical to identify and assess the various accountability roles that actors in the surveillance and response system play. Three types of questions should be considered in order to improve the situation: who is accountable for implementing and for financing the various functions and to whom are they accountable. Answering these types of questions will be essential in order to develop strategies and reforms that will help ensure the maximum effectiveness of the intervention package in promoting evidence-based decision making, especially as it is rolled out across the rest of Georgia.

It should be noted that preliminary results of the present study have already been used to provide assistance to the government of Georgia to roll out the intervention package to the rest of the country. Moreover, the results have served as potent tool by the government in efforts to further strengthen VPD surveillance and response activities. First, PHR*plus* is collaborating with the government in drafting a new public health law. The pending law would improve the organization and management of public health services by defining core public health functions, and making clear the roles and responsibilities of all stakeholders in carrying out these functions. The law would also clarify the financial responsibilities of central and rayonal government levels to ensure timely and efficient implementation of the aforementioned functions including VPD surveillance and response. The second major activity, which was also triggered by the results of this study, is to help the government by making projections of the amount of resources needed for the reformed system for surveillance and response to VPDs and by identifying financial mechanisms for the reformed system.

Overall, the conclusions of the analysis are the following:

- ▲ All components of the intervention package, including the guidelines, job aid workbook, training, and financial standards, were successfully implemented in the intervention rayons primarily as intended.
- ▲ Many expected improvements in analysis and response did occur following implementation of the intervention package, as indicated by measured improvements in:
 - △ The perceived availability of quality surveillance data by CPH staff
 - △ The proportion of CPH staff who perceived themselves capable of performing analysis of surveillance data
 - △ The level of self-reported CPH staff motivation to analyze surveillance data
 - △ The use of analyzed data to prepare statistical reports and to make recommendations on improving surveillance and response activities
- ▲ There is evidence to suggest that at least some of the measured improvements in analysis and response were attributable to the intervention package, as assessed by the use of a pre-post quasi-experimental design.
- ▲ Despite these improvements, the results suggest that the tools that make up the intervention package were not used to their fullest extent for data analysis and evidence-based decision making, as evidenced by the finding that many types of expected analyses were not carried out, and that there was little evidence that analyzed data were used to carry out prevention and control actions.
- ▲ There exist several barriers that operate at the health systems level that adversely affected the effectiveness of the intervention in influencing the availability of data, analysis, and response. Addressing health systems barriers will be critical to ensure the maximum effectiveness of the intervention package in promoting evidence-based decision making, especially as it is rolled out across the rest of Georgia.
- ▲ Health systems barriers are also likely to play important roles in other countries. In order to strengthen surveillance and response systems, donor, governments, and other stakeholders should consider whether and how health systems factors might influence investments to improve the availability of data, analysis, and response.

1. Introduction

It is widely recognized that the analysis and use of information for decision making are essential components of a functioning infectious disease surveillance and response (IDSR) system. Analysis and response can be defined as the process of analyzing epidemiologic and programmatic data, interpreting results, and using these results to help guide decisions on planning and implementing infectious disease interventions and responses, improving existing IDSR activities, and allocating resources. At the local level, the process of analysis and response should be driven by the program manager's desire to use IDSR data to improve decision making. In order for this to occur, surveillance information must be perceived as useful for decision making, and expectations for analysis, interpretation, and translation into action must be clearly laid out. If the decision maker is not the same as the analyst, then the results of the analysis must be summarized and disseminated in timely and standardized formats which make them useful to decision makers.

Unfortunately, in many countries, the analysis and response components are extremely weak, and contribute to the fact that IDSR systems are not functioning optimally. For example, skills in data analysis, data interpretation, and the use of data for decision making are often very limited at the district level. This limited capacity affects the timeliness and adequacy of response, thereby impeding the effectiveness of the surveillance system. In addition, there has been little assessment at the rayon level of the availability and quality of data produced by the IDSR system. As a result, key operational problems have not been readily identified and remedied on a routine basis. Moreover, the scientific literature on how to strengthen health information systems in low- and middle-income countries is extremely scanty (Sauerborn and Lippeveld 2000). In fact, we are not aware of any previous systematic evaluations of the effectiveness of IDSR strengthening initiatives on the analysis and use of routinely-collected surveillance data.

In Georgia, PHR*plus* is currently working with government counterparts at the national and local levels to strengthen vaccine preventable disease prevention and control activities through the dissemination of guidelines, improved tools, and capacity building at the rayon level. One key intervention, as part of a broad package of interventions supported by PHR*plus*, has been the introduction of a tool, or job aid, aimed at standardizing and facilitating IDSR analysis and its translation into public health action (response). Additionally, it provides components for identifying epidemiological, as well as operational, aspects of IDSR analysis and response that are insufficient, as well as a format for specifying actions to be taken to remedy such insufficiencies.

2. Research Objectives and Questions

There are two primary objectives of this operations research study: 1) to document the implementation and effectiveness of the surveillance strengthening intervention package in promoting desired analysis and response at the rayon level; and 2) to provide an in-depth assessment and description of how individual- and system-level factors affect the effectiveness and success of the job aid intervention package. It is hoped that this research will lead to a better understanding of how such an intervention package can best be refined across all of Georgia, as well as designed and implemented in other countries in need of IDSR reform.

The first operations research objective, the evaluation of the intervention package, was accomplished primarily with the implementation of a survey questionnaire focusing on issues of analysis and response among individuals working at rayon-level CPHs who are responsible for analysis and response of VPD data. These data were supplemented by record reviews of completed intervention job aid workbooks as well as focus group/in-depth interviews among the CPH staff at various levels. The following specific research questions are addressed under this first operations research objective:

- ▲ Was the job aid intervention package successfully implemented, and did it function as intended?
- ▲ Did the expected improvements in analysis and response occur after implementation of the job aid intervention package?
- ▲ To what extent did the package of interventions contribute to resultant improvements in analysis and response? And how do individual- and system-level factors affect the effectiveness of the job aid intervention package?

The second operations research objective, assessment of factors that affect effectiveness of the intervention package, was accomplished primarily through qualitative methods (FGDs) of CPH staff and management at various levels. These data were also supplemented by the survey questionnaire and record review. The following specific sub-objectives are addressed under this second operations research objective:

- ▲ Descriptions of individual and system-level incentives and barriers that affect: 1) the use of the intervention package; and 2) analysis of surveillance data and response
- ▲ Perceived usefulness of the intervention package in facilitating analysis and response
- ▲ Description of how the intervention package could be improved to better enhance analysis and response
- ▲ Description of how the intervention package has been used for planning and/or decision making based on VPD data analysis.

3. Background

3.1 Existing VPD Surveillance System in Georgia

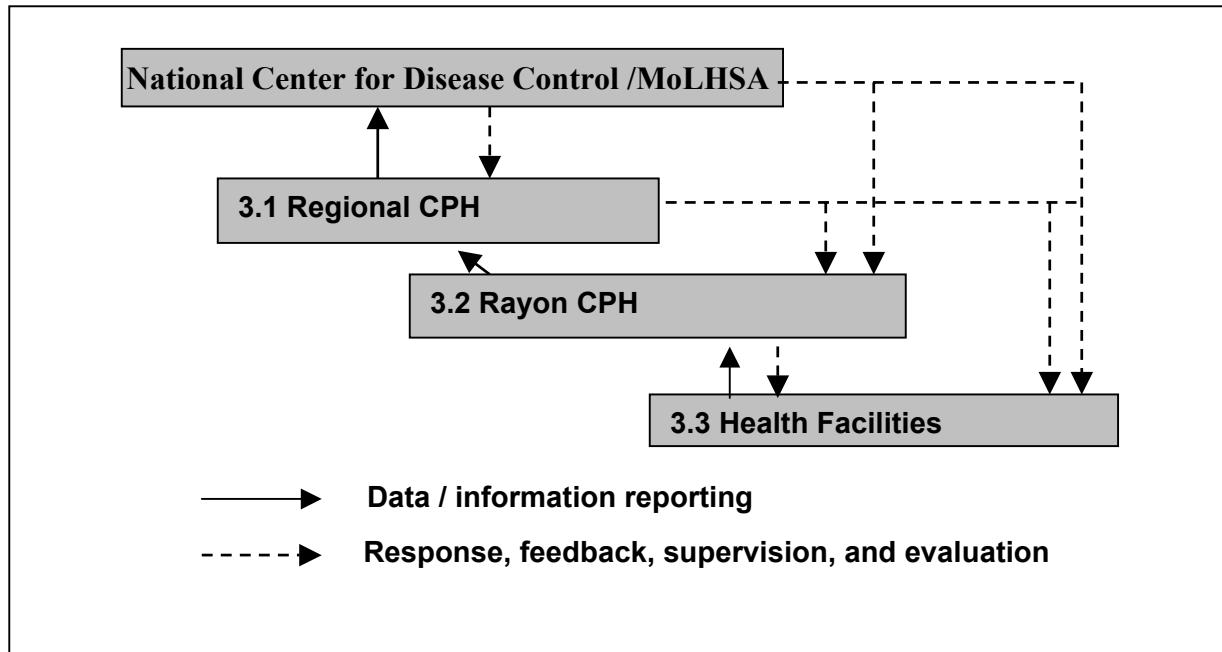
In 1995, Georgia launched an ambitious health reform initiative. The Soviet-style sanitary-epidemiological system was divided into two separate entities: sanitary control and epidemiological service. Epidemiologic services became the responsibility of the newly formed Department of Public Health (DPH), which was made responsible for organizing and supervising the surveillance system as well as other programs. City and rayon governments established CPH offices in order to maintain control over surveillance and immunization in their territories. The rayons that represent regional centers were informally given regional responsibilities regarding the collection of the reports, their submission to the central level, and regional data analysis. There are 13 regional and 66 rayon CPH offices. Rayon CPH offices have at least one epidemiologist on staff, and regional CPH offices usually have several epidemiologists. Sanitary services are undertaken by sanitary inspections established by municipalities.

In 1996, the government introduced a number of new health programs and established new institutions responsible for their implementation. Among those was the National Center for Disease Control (NCDC), which later merged with the Center for Medical Statistics and Information. Within NCDC, there is a special department for VPD control staffed with several epidemiologists each of whom are responsible for a certain disease or a group of diseases such as diphtheria, measles, mumps, pertussis, meningococcal infections, hepatitis B, rubella, tetanus, poliomyelitis, and rabies. Up until the end of 2003, NCDC was responsible for control of VPD and other infections at the national level with programs implemented through contracts with CPHs. At present, the DPH is implementing the infectious disease control program with NCDC and CPHs under contractual arrangements.

Routine information from health facilities is submitted to the NCDC on a monthly and annual basis. Health facilities (polyclinics, ambulatories, and hospitals) are the primary source of epidemiological data and information on VPDs. Physicians who diagnose cases of infectious diseases are required by law to inform higher-level structures, as depicted in Figure 1.¹

¹ Administrative division of the country does not support concept of the regional level, thus regional responsibilities were defined by DPH through contracts.

Figure 1: Routine Reporting Channels of Epidemiological Surveillance System in Georgia to the Level of NCDC and MoLHSA²



The primary health care structure currently in place in Georgia is composed of independent primary health care facilities that are contracted out by the State United Social Insurance Fund. In addition to health care services that are part of national health programs, the contracts stipulate that health facilities deliver specified health care services and collect epidemiological and other information. In return, facilities receive payments. The following types of facilities make up Georgia's public primary health care system:

- ▲ Ambulatories: These facilities are the frontline of the PHC system in rural areas. They are outpatient-only clinics staffed by health care teams consisting of a doctor and a nurse.
- ▲ Children's Polyclinics: Children's polyclinics provide basic and sometimes specialized services to children up to the age of 15. They are located in both rural and urban areas and have outpatient facilities. Services include immunizations and home visits for newborns. The clinics mainly employ pediatricians but may also have part-time specialists.
- ▲ Adult Polyclinics: Adult polyclinics were established to provide services to the population 15 years of age and older. The outpatient clinic is staffed by both generalists and part-time specialists, and typically employ between 30 and 60 staff overall. The clinics mainly provide primary care and are generally found in urban areas.

There are two sources of funding of the surveillance activities at the CPH level: 1) central budget and rayon/city municipal budgets. Central financing covers data collection, reporting and investigation, and response actions during large outbreaks. Municipal funds should cover CPH

² Adapted from Ministry of Labor, Health and Social Affairs 2002.

salaries, laboratory services, and routine investigation and disease control activities (various communicable diseases, rabies), health promotion.

3.2 Intervention

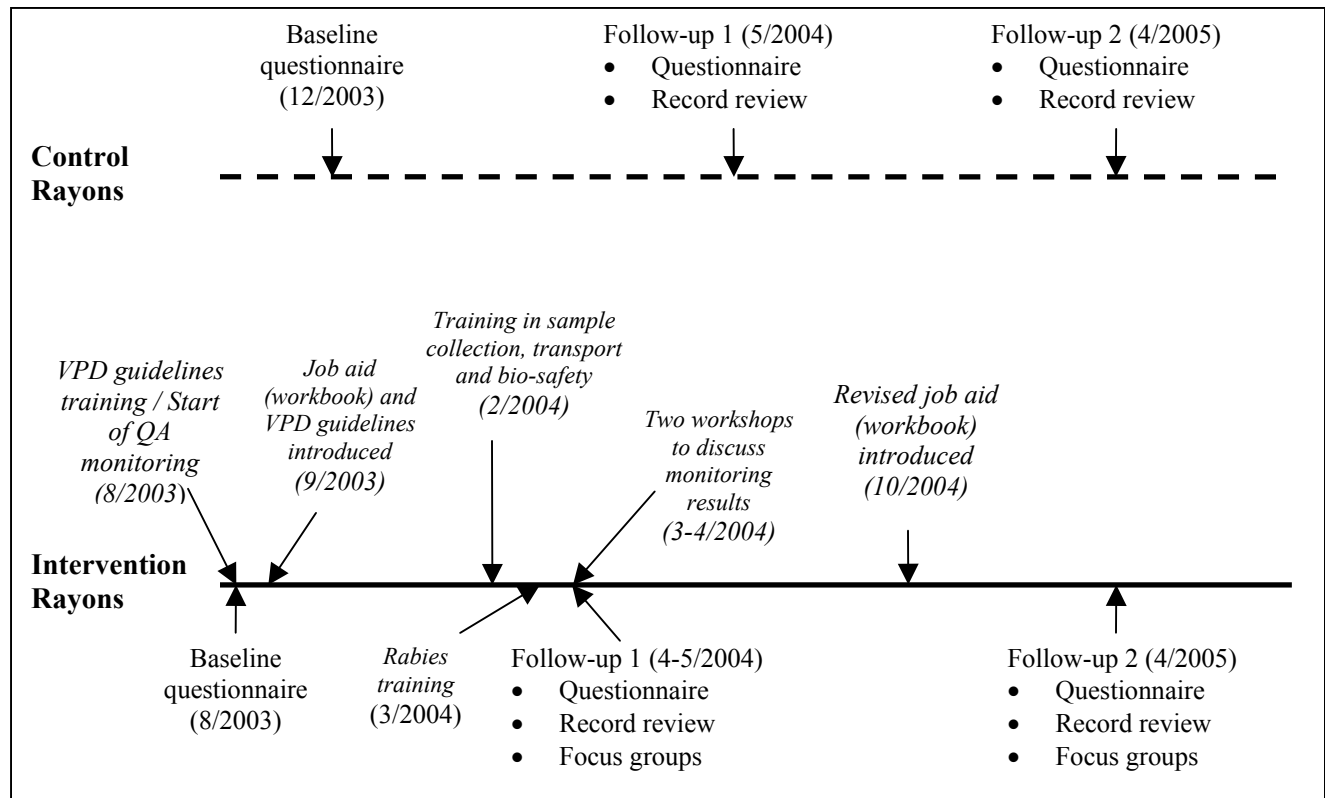
The intervention aimed to improve analysis and response by clarifying roles and responsibilities at the rayon level for analysis and outlining links to actions, by improving capacity, and by ensuring the resources necessary for the non-personnel costs of outbreak investigation and selected monitoring functions. It was hoped that efforts would improve the value that workers place on VPD surveillance information, and as a result, the motivation for evidence-based decision making.

The overall intervention that was assessed consists of several components developed and initiated by *PHRplus*, which includes: the development and introduction of surveillance guidelines for rayon-level public health managers along with a surveillance handbook for health facility staff, a job aid for rayon CPHs, training in the guidelines for both rayon CPH and facility staff and on-the-job technical assistance on as-needed basis, development of respective surveillance financial standards, and financial assistance for selected analysis and response functions. The intervention package was uniformly implemented throughout all 12 rayons of the Imereti region of Georgia.

3.2.1 Job Aid

The job aid was the focal point of the package of interventions and was first introduced and implemented in September 2003 (Figure 2). The job aid is a workbook consisting of worksheets designed to assist CPH IDSR team members to better record, aggregate, and use VPD surveillance data. This job aid provides a detailed template in which critical surveillance data are recorded in a standardized format on a quarterly basis. The worksheets within the job aid are completed for all critical epidemiological data on VPDs submitted to rayon CPH offices. Additionally, the job aid embeds the basic analysis that allows for the identification of IDSR performance and operational problems, such as: flagging under-performing facilities; determining causes of low coverage and major reasons why cases occurred; identifying populations/areas of increased risk; and specifying major challenges to case confirmation. Furthermore, the job aid provides a standardized format for formulating specific response to identified problems, such as measures to correct coverage, to protect populations at risk, or to improve case confirmation. A format is also present for documenting the implementation of suggested measures. Thus, the job aid is a four-in-one tool (data collection, analysis, planning of responses, and self-monitoring of performance) that helps health workers establish the link between surveillance information and response, as well as document their data analysis and utilization for management purposes. Based on survey results at follow-up 1, the workbook was revised slightly in October 2004 prior to follow-up survey 2. An English version of the revised workbook can be found at the Ministry of Labor, Health and Social Affairs and at the NCDC, and through the Internet at http://www.phrplus.org/Pubs/Tool006_fin.pdf. The revisions included: simplifying disease-specific worksheets by eliminating requirements for certain types of analysis and by combining several worksheets into one; where possible, providing lists of ALL potential problems which may be identified as a result of analysis; modifying the layout of selected worksheets based on feedback from the field in order to make it more convenient for CPH workers to record and analyze information; adding a worksheet to facilitate compilation of an annual statistical report by CPH workers; and by providing examples of potential response actions that can be taken by CPH workers in a given situation.

Figure 2: Timeline of Implementation and Operations Research Activities



3.2.2 Guidelines

Uniform and comprehensive guidelines for health workers who deal with infectious disease surveillance were a critical component of the intervention package to ensure the effective functioning of the surveillance system. The guidelines were first introduced and implemented in September 2003 (Figure 2). The guidelines outline how to: 1) identify and register cases of infectious diseases; 2) confirm and classify cases; 3) notify and report; 4) analyze data; 5) investigate outbreaks; and 6) utilize available information for making decisions to prevent and control infectious diseases and improve the functioning of the surveillance system. They are designed primarily for health personnel working at rayon and regional CPHs. Besides the general norms for the surveillance system as a whole, the guidelines include eight disease-specific sections devoted exclusively to guiding public health workers for effective prevention and control of VPDs as well as protocols for sample collection, storage and transportation for each VPD that requires laboratory investigation. An English version of the revised guidelines can be found at the Ministry of Labor, Health and Social Affairs and the NCDC, and through the Internet at http://www.phrplus.org/Pubs/Tool004_fin.pdf.

3.2.3 Training

The training component of the intervention consisted of workshops, seminars, and on-the-job technical assistance (see Figure 2 for a timeline of implementation activities).

- ▲ **Basic surveillance and epidemiology training:** Imereti public health managers and epidemiologists were trained on the principles and elements of basic surveillance and applied epidemiology in preparation for the introduction to the planned surveillance system changes and operations (May 2003).
- ▲ **VPD guidelines training:** Thirty-five CPH and health workers in the pilot region were trained in the new VPD guidelines. The training was led by Curatio and the NCDC (August 2003).
- ▲ **VPD training:** Sixty-five epidemiologists and assistant epidemiologists in the Imereti region participated in a training course on sample collection, transportation, biosafety, and safe vaccination practices. The course was facilitated by the NCDC and Emergency Medicine National Training Center experts (February 2004).
- ▲ **Surveillance workshop:** Forty epidemiologists and CPH directors participated in a surveillance workshop carried out to discuss the results of the IDSR/Immunization situation analysis in the Imereti region. Participants suggested modifications to the technical guidelines and recommended obtaining more feedback from the field. The workshop was led by Curatio and NCDC (March 2004).
- ▲ **Continuous QA monitoring:** Starting from August 2003, Curatio, national experts, and PHR*plus* have continuously monitored progress with the IDSR system introduction in the Imereti region, providing technical assistance and support in the field, and discussing issues and challenges at regional working group meetings.

3.2.4 Financial Standards

Surveillance financing standards were developed by the Georgian Expert Group in the fall of 2003. Because Imereti's 2004 budget was not yet available, an interim reimbursement agreement between the project and the Imereti CPH was developed to establish a mechanism to jumpstart testing/implementation of the new surveillance standards in the region. This financing component, which provided funds for the non-personnel costs of outbreak investigation and selected monitoring functions, continued until Imereti's 2004 budget became available. The financial standards were initiated in response to a PHR*plus*-led study of the costs and financing of the infectious disease prevention and control system. The assessment identified the fixed and variable costs of the existing VPD prevention and control system, assessed the efficiency and adequacy of the current use of funds, and made recommendations on the improving allocation of funds in order to improve efficiency. A key finding was that current funding would not allow adequate implementation of the new guidelines.

4. Methodology

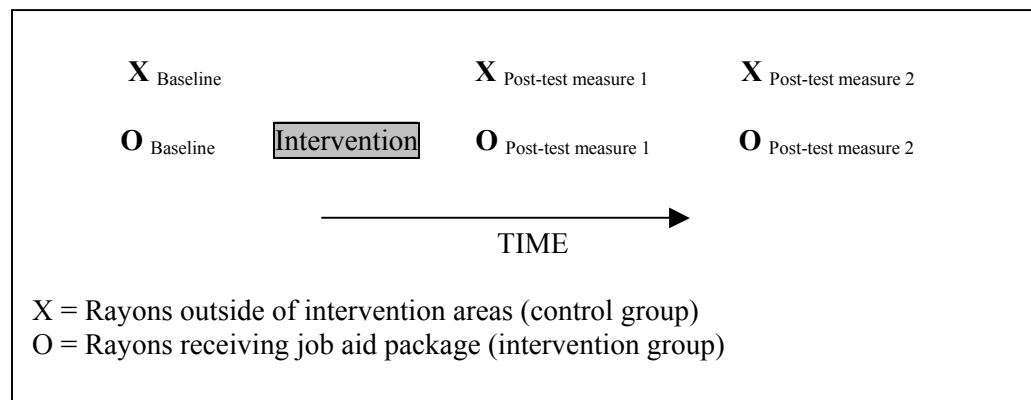
4.1 Research Design

The first operations research objective, assessing the effectiveness of the job aid intervention package, was achieved primarily using quantitative research methods, supplemented where possible with qualitative methods. A pre-post quasi-experimental research design was used for the quantitative evaluation (Figure 3), while FGDs were carried out to provide a richer understanding of the factors influencing the effectiveness of the intervention package. As the job aid intervention package was uniformly implemented within all rayons of the Imereti region, they served as the intervention group. In order to help validate any resultant changes in analysis and response, selected rayons outside the intervention areas served as controls.

Quantitative outcomes pertaining to analysis and response within intervention and control groups were measured at baseline and at two points in time after the implementation of the intervention package. The impact of the intervention package on analysis and response will be assessed by the comparison of the intervention and control group with respect to the relative changes of outcome measures pre- and post-test. Additionally, relative changes within the intervention group pre- and post-test were assessed. The units of analysis include CPH offices, as well as individuals from health facilities, CPH offices, and regional offices.

Figure 3: Research Design and Net Effect

a. Research Design



b. Net Effect of the Job Aid Intervention

$$\text{Net effect} = \left(\begin{array}{|c|} \hline \text{Outcome of} \\ \text{intervention} \\ \text{group post-} \\ \text{test} \\ \hline \end{array} \begin{array}{|c|} \hline \text{Outcome of} \\ \text{intervention} \\ \text{group pre-test} \\ \hline \end{array} \right) - \left(\begin{array}{|c|} \hline \text{Outcome of} \\ \text{control group} \\ \text{post-test} \\ \hline \end{array} \begin{array}{|c|} \hline \text{Outcome of} \\ \text{control group} \\ \text{pre-test} \\ \hline \end{array} \right)$$

4.2 Sample Size and Target Population

All 12 rayons of the Imereti Region, where the surveillance package was planned to be uniformly implemented, served as the intervention group. Three rayons outside the intervention area were selected to serve as controls. CPH offices were selected based firstly on their known surveillance motivation and performance (based on expert experience). Those with similar levels of motivation and performance were then selected based on location (mountainous vs. flat) and population density (by age and sex). The three rayons were Senaki, Chokhatauri, and Tbilisi.

Using survey questionnaires, an individual-level assessment of practices, motivation, and attitudes regarding the analysis and use of surveillance data was conducted with all CPH surveillance staff from the intervention and control areas.

Table 1 shows the actual sample sizes for the various units of analysis for the quantitative evaluation. Variation in sample sizes across the three rounds is due to fluctuations in the availability of local staff. Details on the number and sizes of the FGDs are provided in the next section.

Table 1: Sample Sizes for Survey Questionnaires and Record Reviews

Unit of analysis	Data source	Sample Size					
		Intervention			Control		
		Baseline (10/2003)	Follow-up 1 (4/2004)	Follow-up 2 (4/2005)	Baseline (12/2003)	Follow-up 1 (5/2004)	Follow-up 2 (4/2005)
CPH offices	Record reviews	NA	12	12	NA	3	3
CPH staff	Survey questionnaires	31	39	35	11	11	10

4.3 Sources of Data

The Curatio International Foundation (CIF) was responsible for administering the following data collection instruments: the survey questionnaire of CPH staff, the record review, and the FGDs. CIF also was responsible for the development of the focus group instrument and guidelines and administered all data collection instruments.

CPH staff surveys: Survey questionnaires were administered to all CPH surveillance staff within the intervention and control rayons at three points in time (Figure 2): at baseline (October 2003 and December 2003 for the intervention and control rayons respectively), at a first follow-up (April and May 2004, respectively), and at a second follow-up (April 2005 for both intervention and control rayons). The CPH questionnaires used a combination of closed (yes/no and Likert scale) and open-ended questions, divided into the following four sections: 1) background information, 2) availability of quality surveillance data, 3) analysis of surveillance data, and 4) use and perceived value of the surveillance data, and included the following topics:

- ▲ Perceived value of information
- ▲ Motivation to analyze and interpret data

- ▲ Incentives perceived as important to perform analysis and response
- ▲ Perceived self-efficacy
- ▲ Time spent on analysis/interpretation
- ▲ Barriers to carrying out analysis/response functions

The questionnaire was pre-tested and revised by the Georgian research team prior to baseline implementation. The final version of the intervention questionnaire for follow-up 2 is included in the appendix. For the baseline questionnaire, the survey instruments for intervention and control rayons were identical. For follow-up 1 and 2, a number of questions in the instrument for the intervention rayons were revised so that they referred to the intervention.

Rayon CPH records and reports: CPH records and reports were reviewed at two points in time after the initiation of the intervention to ascertain whether the intervention package was implemented successfully, and was functioning as intended. The record reviews were conducted within both intervention and control rayons in May 2004 and April 2005 (Figure 2). The purpose of the review was: a) to assess completeness and accuracy of the records in the workbooks distributed to rayon epidemiologists in the program intervention areas; and b) to determine the current level of data analysis and use in other rayons beyond the program pilot area. The record review had the following specific objectives:

- ▲ To assess completeness and accuracy of records in the data aggregation section of all worksheets in the workbook
- ▲ To assess completeness and accuracy of data analysis/logical section of all worksheets in the workbook
- ▲ To explore participant views and suggestions on modification/optimization of the worksheets in the workbook
- ▲ To assess the availability of guidelines, recent training, and current level of data analysis and use in the control rayons

Record reviews were conducted in 12 intervention and 3 control rayons using special instruments developed by research team members. The instruments were pre-tested and revised by the Georgian research team. Specific questions were added regarding revised version of the workbook as needed within the intervention rayons. The instruments for the record review in both the intervention and control rayons are included in the appendix.

During the record review, CPH epidemiologists were interviewed in all of the 12 intervention and 3 control rayons. Respondents were those professionals who are directly responsible for maintaining all records and conducting the analyses of surveillance data. In addition, all worksheets that had been completed were photocopied for further detailed analysis and review. We conducted both quantitative and qualitative analysis of data depending on the type of data obtained through the interviews. Comments and answers to qualitative questions have been processed using standard qualitative methods.

The worksheet's data aggregation section was considered as accurate if, through a random check, data in the workbook corresponded to those in the primary data sources and there were no

mathematical mistakes. The worksheet's logical section was considered as accurate if analytical conclusions (e.g., which units performed poorly, causes of low coverage, reasons why cases occurred, who belongs to risk groups, barriers to performance) were made based on a complete set of data and logically reflected these data.

Focus groups: Focus groups were conducted with individuals at rayon and health facility levels of the IDSR system in order to: 1) obtain qualitative data on the perceived value and need for the analysis and use of surveillance data across multiple levels of the IDSR system in the Imereti region; and 2) assess how the analysis and use of data changed since the introduction of the intervention. The qualitative component investigated the experiences and perspectives about surveillance at two points after the intervention to better understand the process of surveillance, the use of the intervention tools, and the barriers to data availability, analysis, and response, including those barriers at the health systems level. The qualitative instruments were designed to provide a richer understanding of topics covered by the quantitative survey and record review, such as perceptions about incentives/motivation to carry out analysis and response, perceptions about their capability of carrying out their analysis and response tasks, the extent to which the intervention helped to remove obstacles and barriers, and problem-solving examples. Focus groups were used to probe individuals to obtain information on ways the intervention components could be improved. The focus group instrument was pre-tested and revised by the Georgia research team prior to implementation.

Focus groups were conducted post-intervention at two points in May 2004 and April 2005 within intervention rayons (Figure 2). The following groups of individuals from intervention CPH offices and health care facilities were included in the focus groups:

- ▲ CPH office epidemiologists
- ▲ CPH office directors
- ▲ Polyclinic clinicians
- ▲ Polyclinic directors

For each group, two FGDs were held at each of the two time periods, and the size of the group ranged from five to seven individuals. Tools for FGDs were developed separately for CPH staff and providers. Participants were mostly the same for the two rounds. The length of the FGD session averaged between 2 and 2.5 hours for CPH staff and between 1 and 1.5 hours for polyclinic staff.

Two CIF researchers conducted each FGD: a moderator who led the discussion and a facilitator who handled all logistics and took notes. The facilitator recorded the personal characteristics of the members making up the FGD and the time, duration, and location of the FGD. As far as possible, the discussions took place in a setting where the session was not interrupted and people felt that they could voice their opinions freely. The FGDs were recorded. Tapes of the discussions were then transcribed for each of the FGDs, which were followed by preliminary coding of the information. Using predefined codes, information was organized and displayed. Notes and selected quotations were translated.

4.4 Data Management

CIF was responsible for the management of all collected data. Data were entered into Microsoft Access using customized entry screens, designed by CIF. All data forms and records collected during this research were held in a secure location by CIF for the duration of the research study. Confidentiality of all respondents was assured through the replacement of any personal identifiers with unrelated unique identifiers as needed.

4.5 Data Analysis

The impact of the intervention package on analysis and response (objective 1) has been assessed using a combination of multiple data points, including information from the quantitative survey, the record review, and the FGDs. The information collected from the quantitative survey was used to compare the level of observed changes in outcome indicators (post-test – pre-test) between intervention and control groups. Results are presented for four types of indicators: 1) implementation of the intervention; 2) availability of quality surveillance data; 3) analysis of surveillance data; and 4) use of surveillance data. The indicators are presented below:

Implementation of intervention

- ▲ Indicator 1 – Proportion of CPH staff that agree there are written guidelines to help guide the analysis of the surveillance data
- ▲ Indicator 2 – Proportion of CPH staff that agree there are written guidelines to help make use of surveillance data (defined as identifying problems with health facilities with prevention and control of VPDs)

Availability of quality surveillance data

- ▲ Indicator 3 – Mean score of respondents for Likert scale questions measuring perceptions of availability of quality surveillance data

Analysis of surveillance data

- ▲ Indicator 4 – Mean score of respondents for Likert scale questions measuring reported level of perceived capability to perform analysis
- ▲ Indicator 5 – Mean score of respondents for Likert scale questions measuring motivation to carry out analysis

Use of surveillance data

- ▲ Indicator 6 – Mean score of respondents for Likert scale questions measuring perceived value of using analyzed surveillance data
- ▲ Indicator 7 – Mean score of respondents for Likert scale questions measuring perceived motivation to use analyzed surveillance data to improve prevention and control of infectious diseases and/or improve the functioning of the surveillance system

Where possible, Likert scale variables that measured related perceptions regarding data analysis and response were grouped and then tested using a Cronbach coefficient alpha correlation analysis, based on baseline results. Grouped variables with a Cronbach coefficient alpha raw score greater than 0.70 were averaged to represent underlying constructs of analysis and response. For example, to assess the availability and quality of surveillance data, results of the following Likert scale questions [Cronbach coefficient alpha (raw) = 0.75] for all respondents were averaged by treatment group, with possible scores ranged from 1-5 (higher scores representing a greater perception among respondents that quality surveillance data are available):

Q9. Subordinate health facilities and labs report their surveillance data in a timely manner

Q10. Reports submitted by subordinate health facilities are fully completed

Q11. I have confidence that the surveillance data reported by subordinate health facilities are accurate

Possible responses were:

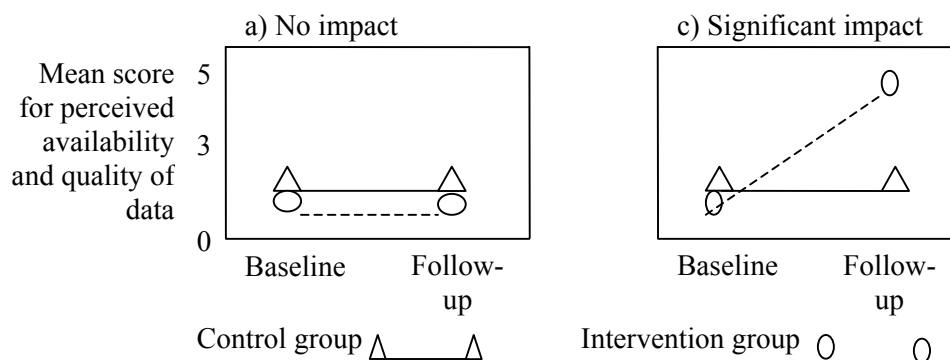
- ▲ Strongly disagree (score = 1)
- ▲ Disagree (score = 2)
- ▲ Neither agree or disagree (score = 3)
- ▲ Agree (score = 4)
- ▲ Strongly agree (score = 5)

The treatment group x survey round interaction term in the following regression model was used to assess the significance of the relative change in outcome indicators between the intervention and control groups from the baseline to follow-up round:

$$Y = \beta_0 + \beta_1(\text{treatment group}) + \beta_2(\text{subject}) + \beta_3(\text{survey round}) + \beta_4(\text{group*round}) + \beta_5(\text{subject*round}) + e$$

The analysis was conducted using the XTGEE procedure in STATA to fit a GEE model to the data to account for repeated measures among the same individuals over time. A two-sided P-value < 0.05 was considered statistically significant. The following illustrative interaction results (Figure 4) provide examples of how the regression model was used to assess the significance of the relative impact of the intervention on outcome indicators (mean score for perceived availability and quality of surveillance data as used here as an example).

Figure 4: Illustrative Example of Interaction Terms and Associated Impact of the Intervention on Mean Score for Perceived Availability and Quality of VPD Data



The quantitative survey analysis was supplemented by the analysis of information collected from the record review and the FGDs. Information from the record reviews was used to assess the extent to which CPH staff both analyzed data, and used analyzed data to carry out responses or actions. In both the intervention and control rayons, information was tabulated on the number of rayons that produce evidence (workbooks or other records) that several types of data analysis were carried out. These types included the analysis of demographic data, morbidity and mortality data, and outbreak investigation data. To assess data use, information was tabulated on the number of rayons that could produce evidence that analyzed data were used to prepare and implement various responses and actions, including the oversight of health care facilities, resource mobilization, and health education campaigns.

For the qualitative analysis, detailed transcripts were prepared for all eight FGDs, which was followed by preliminary coding of the information. Using the predefined codes, information has been organized and displayed. Notes and quotations were translated. FGD results for CPH directors and epidemiologists are given jointly considering that their views on the investigated issues were very similar. For the same reason, results are presented jointly for polyclinic heads and providers.

5. Results

This results section is divided into sub-sections that address the two operations research objectives. Multiple data points were used in assessing each, including qualitative survey of CPH staff working at the regional and rayon level, record reviews carried out in CPH offices, and FGDs of CPH staff and health care facility staff.

5.1 Objective 1: Effectiveness of the Intervention Package

This section identifies and pulls out major themes regarding the effectiveness of the intervention, organized around the following themes: implementation of intervention; availability of quality surveillance data; analysis of surveillance data; and use of surveillance data.

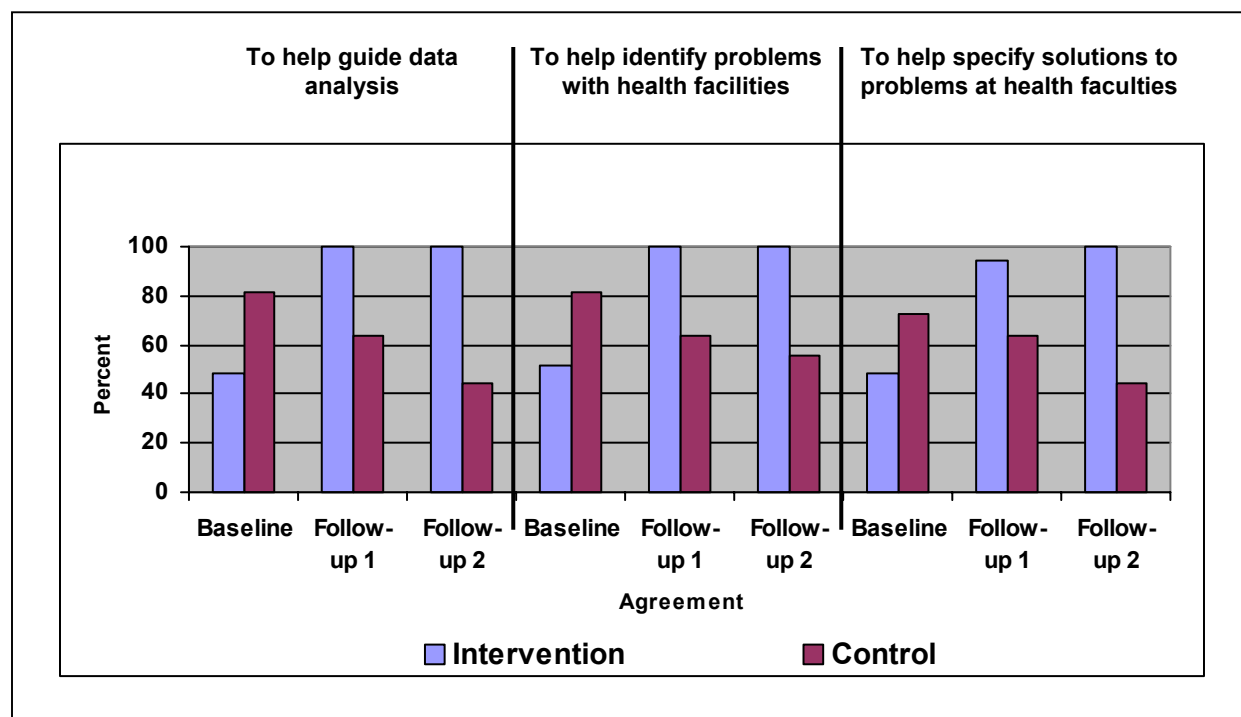
5.1.1 Implementation of Intervention

Results of the survey and the record review demonstrate that the intervention package was implemented as planned within the 12 intervention rayons. The survey results show that while there was a decrease among respondents within control rayons that agreed that there are written guidelines to help guide the analysis of the surveillance data (Indicator 1), the proportion of respondents in the intervention areas who agreed with this statement significantly increased from 48.4 at baseline to 100 percent at follow-up 1 and 2 ($X^2 = 23.8$, $P < 0.01$) (Figure 5). Within the intervention group at follow-up 1 and 2, all stated that such guidelines were clear and useful, and that they were referring to the VPD guidelines that were recently introduced.

The survey results show that while only half (51.6 percent) of intervention respondents of the baseline survey agreed there are written guidelines to help identify problems with health facilities with prevention and control of VPDs (Indicator 2), all agreed with this statement at both follow-up 1 and 2, representing a significant increase [$X^2 = 22.4$ and 21.9 ($P < 0.001$) between the baseline and follow-up 1 and 2, respectively] (Figure 5). Similar to the above findings, there was a significant increase among intervention respondents in the proportion reporting that there are written guidelines to help specify solutions for problems with health facilities in the prevention and control of VPDs, from 48.4 percent on the baseline survey to nearly all at follow-up (94.4 percent and 100 percent at follow-up 1 and 2 respectively; $X^2 = 18.0$ and 23.8 ($P < 0.01$), respectively]. There was a decrease among the control group between survey rounds with respect to the proportion that agreed with the above statements on guidelines for identifying and specifying solutions to problems.

In addition, project records suggest that the financial standards system described was implemented as planned as evident by the fact that the regional CPH office in Imereti reported receiving and processing reimbursement requests from each of the 12 districts during the intervention period.

Figure 5: Percent of Respondents in Agreement that there Exist Written Guidelines Related to VPD Surveillance at the CPH for the Following Activities, by Treatment Group and Survey Round



5.1.2 Availability of Quality Surveillance Data

In the follow-up 2 survey round, over two-thirds (71.5 percent) of intervention respondents ($n = 35$) agreed that there is sufficient data from health facilities to make it possible to complete the workbook on a quarterly basis. However, when CPH staff respondents responsible for surveillance and response were asked a series of questions related to timeliness, completeness, and accuracy of surveillance data, (Table 2), results were mixed. While the proportion of intervention respondents that agreed that subordinate health facilities report their surveillance data in a timely manner increased from 16.1 percent in the baseline to 45.2 percent in follow-up 2, the majority across all three rounds in both the intervention and control groups either disagreed or were ambivalent on the timeliness of data from health facilities. Such mixed results were similar for completeness and accuracy within both intervention and control groups across all three rounds.

The responses on the three survey questions on timeliness, completeness, and accuracy of surveillance data from health facilities were averaged to form a single index score as an indicator for perceived availability of quality surveillance data [Cronbach coefficient alpha (raw) = 0.75; mean score for both intervention and control groups = 2.82; SD = 0.67; $n = 42$] (Table 3). Following the largely ambivalent responses to these three questions, the mean score for this index increased only modestly by 0.53 between the baseline and follow-up 2 among the intervention group, as compared to no change among the control group. Accordingly, the effect of the intervention package was found to be only marginally statistically significant ($P = 0.09$) on the perception of the availability of quality surveillance data based on the treatment group x survey round interaction term.

Table 2: Availability and Quality of Surveillance Data

			Disagree [†]	Neither agree/ disagree	Agree [‡]	Total
			n (%)	n (%)	n (%)	n (%)
Subordinate health facilities and labs report their surveillance data in a timely manner	Baseline	Intervention	14 (45.2)	12 (38.7)	5 (16.1)	31 (100)
		Control	5 (45.5)	3 (27.3)	3 (27.3)	11 (100)
	FU-1	Intervention	9 (25.3)	14 (38.9)	13 (36.1)	36 (100)
		Control	4 (36.4)	3 (27.3)	4 (36.4)	11 (100)
	FU-2	Intervention	8 (22.9)	8 (22.9)	19 (45.2)	35 (100)
		Control	5 (50.0)	1 (10.0)	4 (40.0)	10 (100)
Reports submitted by subordinate health facilities are fully completed	Baseline	Intervention	12 (38.7)	15 (48.4)	4 (12.9)	31 (100)
		Control	2 (18.2)	6 (54.5)	3 (27.3)	11 (100)
	FU-1	Intervention	3 (8.3)	21 (58.3)	12 (33.3)	36 (100)
		Control	3 (27.3)	3 (27.3)	5 (45.5)	11 (100)
	FU-2	Intervention	7 (20.0)	15 (42.9)	13 (37.1)	35 (100)
		Control	4 (40.0)	3 (30.0)	3 (30.0)	10 (100)
I have confidence that the surveillance data reported by subordinate health facilities are accurate	Baseline	Intervention	12 (38.7)	14 (45.2)	5 (16.1)	31 (100)
		Control	3 (27.3)	2 (18.2)	6 (54.5)	11 (100)
	FU-1	Intervention	3 (11.1)	19 (52.8)	13 (36.1)	36 (100)
		Control	3 (27.4)	1 (9.1)	6 (54.5)	11 (100)
	FU-2	Intervention	4 (11.4)	15 (42.9)	16 (45.7)	35 (100)
		Control	1 (10.0)	5 (50.0)	4 (40.0)	10 (100)

[†]Includes disagree and strongly disagree

[‡]Includes agree and strongly agree

Table 3: Mean Score for Index that Measures Perceived Availability of Quality Surveillance Data (Indicator 3)

Group	Baseline	Follow-up 1	Follow-up 2
Intervention	2.75	3.26	3.28
Control	3.00	3.18	3.00

Note: Possible scores ranged from 1-5, with higher scores representing a greater perception among respondents that quality surveillance data are available.

5.1.3 Analysis of Surveillance Data

Capacity to analyze surveillance data (survey): Within both the baseline and the two follow-up survey rounds, nearly all respondents (greater than 90 percent for all rounds) in both the intervention and control groups reported that they are responsible for performing at least some level of analysis. Overall, respondents in the intervention group perceived themselves to have sufficient capacity to perform analysis and response of surveillance data after the intervention was implemented (Table 4). Results of questions on perceived skills and capacity to perform data analysis were very similar between the intervention and the control groups and across survey rounds. At baseline, the

intervention group was somewhat ambivalent towards their skills and capacity to perform data analysis, with roughly half agreeing and half neither agreeing nor disagreeing, that they possess sufficient data analysis skills and capacity. Surprisingly, all control respondents stated they possessed sufficient data analysis skills and capacity at baseline, and while decreasing, the proportion that agreed with these statements remained above 50 percent at both follow-ups. While the vast majority of control respondents disagreed that they could use additional training in data analysis, the proportion of intervention respondents that disagreed with this statement decreased from 87.1 percent at baseline to 57.1 percent at follow-up 2, with 34.3 percent unsure if they required additional training at follow-up 2. This may in part be due to respondents being introduced to new and unfamiliar data analyses with the introduction of the job aid (workbook).

The two questions asking about perceived skills and capacity to perform data analysis on the survey questionnaire were averaged to form a single index score as an indicator for the level of perceived capability to perform analysis, based on baseline results [Cronbach coefficient alpha (raw) =.78; mean score=3.9; SD=.62; n=45)] (Table 5). Based on the interaction term of treatment group x survey round from baseline to follow-up 2, the effect of the intervention package was statistically significant ($P < 0.01$) on the perceived capability to perform analysis, as the mean score for this index increased by 0.50 among the intervention group, as compared to a decrease of 0.70 among the control group. The effect of the intervention package was also statistically significant in follow-up 1.

Table 4: Perceived Capacity to Analyze Surveillance Data

			Disagree [†]	Neither agree/ disagree	Agree [‡]	Total
			n (%)	n (%)	n (%)	n (%)
I possess sufficient skills to analyze and interpret surveillance data	Baseline	Intervention	2 (6.6)	14 (46.7)	14 (46.7)	30 (100)
		Control	0 (0.0)	0 (0.0)	11 (100)	11 (100)
	FU-1	Intervention	0 (0.0)	1 (2.8)	35 (97.2)	36 (100)
		Control	0 (0.0)	3 (27.2)	8 (72.8)	11 (100)
	FU-2	Intervention	1 (2.9)	4 (11.4)	30 (85.7)	35 (100)
		Control	0 (0.0)	4 (40.0)	6 (60.0)	10 (100)
I feel fully capable of carrying out analysis of surveillance data	Baseline	Intervention	4 (12.9)	10 (32.3)	17 (54.8)	31 (100)
		Control	0 (0.0)	0 (0.0)	11 (100)	11 (100)
	FU-1	Intervention	0 (0.0)	3 (8.3)	33 (91.7)	36 (100)
		Control	1 (9.1)	2 (18.2)	8 (72.8)	11 (100)
	FU-2	Intervention	2 (5.8)	3 (8.6)	30 (85.7)	35 (100)
		Control	0 (0.0)	4 (40.0)	6 (60.0)	10 (100)
No additional training in the analysis of surveillance data is needed for me to successfully do my job	Baseline	Intervention	27 (87.1)	3 (9.7)	1 (3.2)	31 (100)
		Control	10 (90.9)	1 (9.1)	0 (0.0)	11 (100)
	FU-1	Intervention	28 (77.8)	7 (19.4)	1 (2.8)	36 (100)
		Control	9 (81.8)	1 (9.1)	1 (9.1)	11 (100)
	FU-2	Intervention	20 (57.1)	12 (34.3)	3 (8.6)	35 (100)
		Control	10 (100)	0 (0.0)	0 (0.0)	10 (100)

[†]Includes disagree and strongly disagree

[‡]Includes agree and strongly agree

Table 5: Mean Score for Index 24-25 that Measures Level of Perceived Capability to Perform Analysis (Indicator 4)

Group	Baseline	Follow-up 1	Follow-up 2
Intervention	3.40	4.13	3.90
Control	4.50	4.00	3.80

Note: Possible scores ranged from 1-5, with higher scores representing a greater perceived capability to perform analysis.

Motivation to carry out analysis of surveillance data (survey): While nearly three quarters (72.8 percent) of respondents in control rayons agreed (either agreed or strongly agreed) with the statement on the survey questionnaire that they were motivated to perform analysis of surveillance data at baseline, with none disagreeing, over half of respondents within the intervention rayons either disagreed or were ambivalent to this statement at baseline (Table 6). However, the proportion of intervention respondents who agreed that they were motivated to perform analysis of surveillance data increased substantially to 83.3 percent and 65.7 percent after the intervention package was implanted at follow-up 1 and 2 respectively. Interestingly, the level of motivation to perform analysis decreased substantially among control respondents at follow-up 2, with 50 percent either disagreeing or ambivalent that they were motivated. Among control respondents, nearly all of the 35 respondents at follow-up 1 and 2 (100 percent and 91.4 percent respectively) reported that their motivation to analyze VPD surveillance data improved since the introduction of the workbook and training. Further, of the 23 intervention respondents that either agreed or strongly agreed that they were very motivated to perform analysis of surveillance data at follow-up 2, all either agreed or strongly agreed that the workbook and training have contributed to their motivation.

Table 6: Motivation to Perform Analysis

			Disagree [†]	Neither agree/ disagree	Agree [‡]	Total
			n (%)	n (%)	n (%)	n (%)
I am very motivated to perform analysis of surveillance data on a regular basis	Baseline	Intervention	7 (22.6)	12 (38.7)	12 (38.7)	31 (100)
		Control	0 (0.0)	3 (27.3)	8 (72.8)	11 (100)
	FU-1	Intervention	2 (5.6)	4 (11.1)	30 (83.3)	36 (100)
		Control	1 (9.1)	1 (9.1)	9 (81.8)	11 (100)
	FU-2	Intervention	5 (14.3)	7 (20.0)	23 (65.7)	35 (100)
		Control	3 (30.0)	2 (20.0)	5 (50.0)	10 (100)

[†]Includes disagree and strongly disagree

[‡]Includes agree and strongly agree

In accordance with the results presented in Table 6, the intervention package had a significant impact ($P = 0.03$) on the reported motivation to analyze surveillance data, as measured by the treatment group x survey round interaction term (Table 7).

Table 7: Mean Score of Perceived Motivation to Perform Analysis of Surveillance Data on a Regular Basis (Indicator 5)

Group	Baseline	Follow-up 1	Follow-up 2
Intervention	3.16	3.89	3.57
Control	4.09	4.00	3.50

Note: Possible scores ranged from 1-5, with higher scores representing a greater perceived motivation to perform analysis.

The primary sources of motivation for performing analysis of surveillance data were similar across survey rounds for both the intervention and control groups. The top reason cited as the primary source of motivation for performing analysis of surveillance data at baseline as well as at follow-up 1 and 2 was “responsibility of the job.” The second most cited reason for performing analysis at follow-up 1 was “to improve the surveillance of VPDs in their Rayon,” while the second most cited reason at follow-up 2 was “money/salary.”

Perceived usefulness of the workbook and guidelines for analysis (survey): Respondents in the intervention group were asked a number of questions on the survey questionnaire on the perceived usefulness of the workbook and guidelines. All of the 35 intervention respondents at both follow-up 1 and 2 agreed that the workbook is currently being used, and that the workbook in its current format (revised for follow-up 2) has helped to facilitate analysis of surveillance data (indicator 4). All but one of the intervention respondents at follow-up 2 agreed that the revised workbook was easier to use than the original one.

Evidence of data analysis (record review): Data from the record review are presented for 2004 only as this was the only complete year’s worth of information during the study. Data from 2003 are excluded here as they represented only October–December, during which time the full intervention package was being rolled out. Data from the record review shows the level of use of the workbook to analyze VPD data across all months of 2004, typically in the form of data aggregation, varied, ranging from 66.7 percent to 100.0 percent (Table 8).

Table 8: Percentage of Intervention Rayons Completing Job Aid Workbook Data Analysis Sections, 2004 (Follow-up round 2)

Workbook section	Percentage of rayons completing workbook sections	Percentage of rayons completing sections accurately
n = 12 rayons		
Demographics	83.3	83.3
Monthly assessment of reporting	66.7	33.3
Monthly assessment of morbidity	100.0	50.0
Quarterly assessment of timeliness of urgent case notification	75.0	58.3
Annual assessment of morbidity and mortality	75.0	50.0
Priority infectious diseases this year	91.7	75.0
Quarterly assessment of case/outbreak investigation rates	66.7	58.3
Selected infectious disease morbidity	75.0	50.0
Selected infectious disease mortality	75.0	8.3
Disease prevention and control	66.7	33.3
Mean completion rate	77.5	50.0

Of those workbooks that were completed in 2004, the proportion that were considered accurately completed, as verified through comparison with original source data, varied widely, ranging from 8.3 percent to 83.3 percent. While these statistics stand in contrast to the perceived capacity and motivation to perform analysis found on the survey questionnaire during follow-up, the mean completion rate of workbook sheets increased from 49.2 percent (Standard deviation (SD) = 13.3) in 2003 to 77.5 percent (SD = 11.14) in 2004, while the mean completion rate of workbook sheets considered accurate increased from 29.1 percent (SD = 12.58) in 2003 to 50.0 percent (SD = 21.52) in 2004 (2003 data not shown, calculated in 2003 since the introduction of the intervention from October to December 2003). No documented evidence of analyzing VPD data was found at the three control rayons during the record reviews.

5.1.4 Use of Analyzed Surveillance Data

Perceived value of using analyzed data (survey): Over all survey rounds, the vast majority of respondents in both the intervention and the control groups (85.7 percent–100 percent) appeared to place great value and importance on the use of VPD data, according to five questions related to this topic (Table 9).

Table 9: Perceived Value of Using Analyzed VPD Surveillance Data

			Disagree [†]	Neither agree/ disagree	Agree [‡]	Total
			n (%)	n (%)	n (%)	n (%)
Epidemiological data are essential for providing effective surveillance of vaccine-preventable diseases in my rayon	Baseline	Intervention	1 (3.4)	2 (6.9)	26 (89.7)	29 (100)
		Control	0 (0.0)	0 (0.0)	11 (100)	11 (100)
	FU-1	Intervention	1 (2.8)	2 (5.5)	33 (91.7)	36 (100)
		Control	1 (9.1)	0 (0.0)	10 (90.9)	11 (100)
	FU-2	Intervention	0 (0.0)	5 (14.3)	30 (85.7)	35 (100)
		Control	1 (9.1)	0 (0.0)	10 (90.9)	11 (100)
Data from subordinate health facilities must be analyzed in order to be useful	Baseline	Intervention	1 (3.2)	1 (3.2)	29 (93.6)	31 (100)
		Control	0 (0.0)	0 (0.0)	11 (100)	11 (100)
	FU-1	Intervention	0 (0.0)	0 (0.0)	36 (100)	36 (100)
		Control	0 (0.0)	1 (9.1)	10 (90.9)	11 (100)
	FU-2	Intervention	0 (0.0)	0 (0.0)	35 (100)	35 (100)
		Control	0 (0.0)	0 (0.0)	10 (100)	10 (100)
I place great importance on providing feedback to subordinate health facilities based on the data that I routinely analyze.	Baseline	Intervention	1 (3.2)	3 (9.7)	27 (87.1)	31 (100)
		Control	0 (0.0)	1 (9.1)	10 (90.9)	11 (100)
	FU-1	Intervention	0 (0.0)	1 (2.8)	35 (97.2)	36 (100)
		Control	0 (0.0)	1 (9.1)	10 (90.9)	11 (100)
	FU-2	Intervention	0 (0.0)	1 (2.9)	34 (97.1)	35 (100)
		Control	0 (0.0)	0 (0.0)	10 (100)	10 (100)
Analysis of surveillance data is useful because it provides a basis for decision making	Baseline	Intervention	0 (0.0)	0 (0.0)	31 (100)	31 (100)
		Control	0 (0.0)	0 (0.0)	11 (100)	11 (100)
	FU-1	Intervention	0 (0.0)	0 (0.0)	36 (100)	36 (100)
		Control	0 (0.0)	0 (0.0)	11 (100)	11 (100)
	FU-2	Intervention	0 (0.0)	0 (0.0)	30 (100)	35 (100)
		Control	0 (0.0)	0 (0.0)	10 (100)	10 (100)

			Disagree [†]	Neither agree/ disagree	Agree [‡]	Total
			n (%)	n (%)	n (%)	n (%)
		Control	0 (0.0)	1 (10.0)	9 (90.0)	10 (100)
It is important that decisions regarding prevention and control of infectious diseases be based on solid evidence	Baseline	Intervention	0 (0.0)	3 (10.0)	27 (90.0)	30 (100)
		Control	0 (0.0)	0 (0.0)	11 (100)	11 (100)
	FU-1	Intervention	0 (0.0)	0 (0.0)	36 (100)	36 (100)
		Control	0 (0.0)	0 (0.0)	11 (100)	11 (100)
	FU-2	Intervention	0 (0.0)	0 (0.0)	35 (100)	35 (100)
		Control	0 (0.0)	0 (0.0)	11 (100)	10 (100)

[†]Includes disagree and strongly disagree

[‡]Includes agree and strongly agree

The responses to the five questions on the survey questionnaire regarding usefulness of surveillance data were averaged to form a single index score as an indicator for perceived value of using surveillance data (indicator 5) [Cronbach alpha (raw) = 0.70; mean = 4.15; SD = 0.30; n = 45] (Table 10). As nearly all respondents within both the intervention and the control groups consistently reported over all three survey rounds that they placed high value and importance on the use of surveillance data, the impact of the intervention package was found to be limited, based on the interaction term of treatment group x survey round between the baseline and follow-ups (not statistically significant, P = 0.11 and 0.18 for follow-up 1 and 2 respectively).

Table 10: Mean Score for Index that Measures Perceived Value of Using Analyzed VPD Surveillance Data (Indicator 6)

Group	Baseline	Follow-up 1	Follow-up 2
Intervention	4.08	4.28	4.09
Control	4.56	4.36	4.38

Note: Possible scores ranged from 1-5, with higher scores representing a greater perception among respondents of the value of using analyzed surveillance data.

At follow-up survey 1 and 2, approximately a third (33.3 percent and 28.9 percent respectively) of the intervention group stated that their CPH office had mobilized additional resources for the prevention/control of VPD from the municipal budget to act on recommendations resulting from the analysis undertaken with the workbook. No information on resource mobilization is available from the control CPH offices

Perceived motivation to use analyzed surveillance data (survey): The majority of respondents in both the intervention and the control groups over all three survey rounds (60.0 percent - 88.6 percent) agreed with the statement that they were very motivated to use analyzed surveillance data to improve prevention and control of infectious diseases and/or improve the functioning of the surveillance system (Table 11). Further, in both follow-up 1 and 2, nearly all (100 percent and 91.3 percent, respectively) of the 36 respondents in the intervention group reported that their motivation to use analyzed VPD surveillance data improved since the introduction of the workbook and trainings.

Table 11: Motivation to Use Analyzed VPD Data

			Disagree [†]	Neither agree/ disagree	Agree [‡]	Total
			n (%)	n (%)	n (%)	n (%)
I am very motivated to use analyzed surveillance data to improve prevention and control of infectious diseases and/or improve the functioning of the surveillance system	Baseline	Intervention	2 (6.5)	7 (22.6)	22 (70.9)	31 (100)
		Control	0 (0.0)	2 (18.2)	9 (81.8)	11 (100)
	FU-1	Intervention	0 (0.0)	5 (13.9)	31 (76.1)	36 (100)
		Control	1 (9.1)	1 (9.1)	9 (81.8)	11 (100)
	FU-2	Intervention	1 (2.8)	3 (8.6)	31 (88.6)	35 (100)
		Control	2 (20.0)	2 (20.0)	6 (60.0)	11(100)

[†]Includes disagree and strongly disagree

[‡]Includes agree and strongly agree

As a large majority of respondents within both the intervention and the control groups consistently reported over all three survey rounds that they are very motivated to use surveillance data, the impact of the intervention package on motivation to use such data was found to be limited, based on the interaction term of treatment group x survey round between the baseline and follow-ups (not statistically significant, $P = 0.90$ and 0.21 for follow-up 1 and 2 respectively) (Table 12).

Table 12: Mean Score on Perceived Motivation to Use Analyzed Surveillance Data to Improve Prevention and Control of Infectious Diseases and/or Improve the Functioning of the Surveillance System (Indicator 7)

Group	Baseline	Follow-up 1	Follow-up 2
Intervention	3.81	3.94	3.92
Control	4.18	4.09	3.60

Note: Possible scores ranged from 1-5, with higher scores representing a greater perceived motivation to use analyzed surveillance data.

The primary sources of motivation for using analyzed surveillance data were similar to those for performing analysis. These primary sources of motivation for data use were similar across survey rounds for both the intervention and the control groups. The top reason cited as the primary source of motivation for using surveillance data at baseline as well as at follow-up 1 and 2 was “responsibility of the job.” The second most cited motivation for using surveillance data at follow-up 1 and 2 was “to improve the surveillance of VPDs in my rayon,” while “money/salary” was the second most frequently cited response for use of surveillance data at baseline.

Perceived usefulness of the workbook and guidelines for response (survey): In both follow-up 1 and 2 survey rounds, nearly all (91.7 percent and 91.4 percent) respondents from intervention rayons reported that the workbook in its current format has contributed to the use of surveillance data as an input into priority setting and planning. Accordingly, nearly all of the intervention respondents at both follow-up 1 and 2 (97.2 percent each) reported that the VPD guidelines that were recently introduced were clear and useful.

To understand how respondents in CPH offices were using analyzed information, the follow-up 2 survey included Likert-scale questions on whether their rayon routinely uses surveillance data for each of the following types of actions:

- ▲ Identifying insufficiencies of health facilities in preventing and controlling VPDs

- ▲ Making recommendations to subordinate health facilities on ways performance may be improved
- ▲ Carrying out special measures or campaigns to protect populations at risk
- ▲ Planning case/outbreak control measures
- ▲ Mobilizing additional resources for surveillance and/or responses
- ▲ Implementing measures to improve case confirmation
- ▲ Planning procurement of supplies or equipment
- ▲ Securing emergency reserves of vaccines, drugs, and/or supplies
- ▲ Carrying out personnel training

A rayon was classified as having routinely used surveillance information for a specific type of action if the mean score among respondents was equal to or greater than four (out of a Likert scale of five), meaning that, on average, respondents agreed or strongly agreed. These self-reported results, presented in Table 13, indicate that CPH respondents of most rayons report using surveillance information for a broad range of actions. For example, almost all (92 percent) rayons are classified as routinely using surveillance data from three or more actions, and the majority (58 percent) of rayons are classified as routinely using data for seven or more actions.

Table 13: Percentage of Rayons in Which CPH Respondents Report Routine Use of Surveillance Information, by Number of Action Types

Number of Actions	Percent
	n=12 rayons
Three or more actions	92
Four or more actions	83
Five or more actions	83
Six or more actions	75
Seven or more actions	58
Eight or more actions	42
Nine or more actions	42

Evidence of data use (record review): To verify the results from the analysis of the self-reported data from the survey questionnaire, record reviews were administered to assess the extent to which rayonal staff use surveillance data. Table 14 presents the percentage of intervention rayons that reportedly use the sections of the workbook that are intended to prompt CPH workers to make data-driven recommendations across all months of 2004. The results indicate that use of these workbook sections varied widely, ranging from 0.0 percent to 83.3 percent. It should be noted that all rayons were advised to complete each worksheet, regardless of whether any outbreaks were reported. While these statistics stand in contrast to the perceived value and motivation to use analyzed VPD data on the survey questionnaire during follow-up, the average proportion of workbook sheets that show data use completed increased from 30.0 percent (SD = 19.72) in 2003 to 35.8 percent (SD = 25.16) in 2004 (2003 data not shown, calculated in 2003 since the introduction of the intervention from October to December 2003).

Table 14: Percentage of Intervention Rayons Completing Job Aid Workbook Data Conclusion Sections, 2004

Workbook section	Percentage of rayons completing workbook sections
	n = 12 rayons
Demographics	58.3
Monthly assessment of reporting	33.3
Monthly assessment of morbidity	83.3
Quarterly assessment of timeliness of urgent case notification	33.3
Annual assessment of morbidity and mortality	33.3
Priority infectious diseases this year	41.7
Quarterly assessment of case/outbreak investigation rates	25.0
Selected infectious disease morbidity	0.0
Selected infectious disease mortality	0.0
Disease prevention and control	50.0
Mean completion rate	35.8

The record review included a number of questions about the use of analyzed surveillance data (one representative from each rayonal CPH office responded). Each respondent was asked to show evidence in the form of documentation of all uses cited. In response to a question asking whether the intervention respondent prepared ANY statistical reports using the workbook, 9 out of 12 (75 percent) showed evidence that they had prepared such statistical reports. No such evidence was available among the three control rayons. In response to a question on whether the intervention respondents produced ANY written analyses or analytical report (“Conjuncture” for NCDC) about the epidemiological situation, performance, planned or implemented actions using the workbook, 10 out of 12 (83.3 percent) showed evidence that they had prepared such reports. No such evidence was available among the three control rayons.

5.2 Objective 2: In-depth Assessment of Factors that Affect Effectiveness of the Intervention Package

This section identifies major themes and issues that emerged from the two rounds of FGDs of CPH staff and health care facility staff related to perceived factors that affected the effectiveness of the intervention package. The section is organized around the following topics: the availability of quality surveillance data; the analysis of surveillance data; and the use of analyzed surveillance data.

5.2.1 Availability of Quality Surveillance Data

Changes during the intervention period: CPH directors and epidemiologists were asked whether they have observed changes in the quality (timeliness, completeness, and accuracy) of the surveillance data (monthly reports and urgent notifications) received from subordinate health care

facilities in the eighteen months since the intervention was initiated. CPH heads and staff epidemiologists stressed that all three aspects of data quality had significantly improved during the intervention period, as evidenced by the monthly reports and urgent notifications submitted by health care facilities.

“In my rayon, for example, no data were submitted to our level before the intervention. Currently reports also are submitted on a regular basis. Everyone at the facility level knows that submitting data to the CPH office is obligatory.” (CPH epidemiologist)

“We did not pay any attention to any of the epidemiological data before the intervention and never analyzed data at all. Some of the facilities did not even send us any data. Now situation in this regard has been significantly improved..” (CPH epidemiologist)

“Epidemiologists became more active. Demand from the CPH level became more systematic and thus the overall situation has improve.” (CPH epidemiologist)

Polyclinic chiefs and providers also cited improvements in the registration and notification of infectious diseases.

“Probably all detected infectious disease cases are registered at our facility. Staff recognizes that those regulations/principles used to guide the routine work are mandatory for everyone in the facility.” (polyclinic provider)

“Number of registered cases has been sufficiently increased during last 18 month and I think that regular demand from upper levels also has contributed to this result.” (polyclinic provider)

While respondents claimed the data quality situation has improved, problems in receiving quality data from subordinate health care facilities were also mentioned.

“There are some problems with regard to timeliness and accuracy, but nevertheless we possess sufficient information from subordinate facilities in order to be aware about general epidemiological situation in the rayon.” (CPH epidemiologist)

“The gaps still exist regarding timeliness of reported surveillance data. Some of the facilities submit reports with delays which decrease overall rate of registered cases, but in general I would say that situation has been improved.” (CPH epidemiologist)

“More focus should be made on timeliness with regard of urgent case notification and summary notifications as well. In case when notifications are received with delays, we complete one reporting form for two months data. I’m not sure whether it is correct or not, because in fact it is two different reports instead of one.” (CPH epidemiologist)

One respondent mentioned that while there was a sharp improvement in all three aforementioned parameters of reported surveillance data during the first ten months of the intervention, the progress since that time has been minimal.

“I would say that there were no improvements observed during last 8 month. I think that further improvement with regard of timeliness, accuracy and completeness was possible

but situation is unchanged due to the absence of penalties and subsequent actions for poor performance. We can give only verbal instructions and that's it." (CPH epidemiologist)

Factors that affected effectiveness of intervention: When asked about the factors that best explain the improvement in data quality, three types of factors were mentioned: the trainings of rayon and health facility staff, the availability of standard recording and reporting forms, and the perception of health rayon and health facility staff that managers from upper levels value surveillance data. When probing on the relative importance of each of these factors, participants stated that the factors were inter-related, and that it was difficult to assess the role of individual factors on improving the quality of surveillance data. Some participants mentioned the last factor, which is more general and encompasses the other two factors, as the most important.

With respect to the increased attention placed on the importance of surveillance data, CPH epidemiologists mentioned that health care providers have demonstrated a greater sense of responsibility regarding their role in VPD surveillance as compared to the situation prior to the intervention, and that the intervention led to a clear understanding of their roles, job functions and current regulations.

"The intervention led to a clear understanding about my own functions and job responsibilities." (CPH epidemiologist)

"Sense of responsibility replaced the fear. Providers are supplied with all necessary materials, and have adequate knowledge. They know that one will come and check their work; they would be embarrassed if found to be working poorly and thus try to do the job properly." (CPH epidemiologist)

"Since providers became more active and more responsible for the work they ordinary do, and the number of registered cases of infectious diseases has been significantly increased." (CPH epidemiologist)

"Nobody from upper levels cared about reporting of quality surveillance data before the intervention." (CPH epidemiologist)

A number of polyclinic providers also mentioned that there was increased interest in the registration and notification of VPDs and that prior to the intervention, providers feared that reporting infectious disease cases could be construed by superiors as indicating poor performance of a doctor.

"Before, when there was no interest, we were very passive." (polyclinic provider)

"Now this old attitude has completely changed." (polyclinic provider)

In addition, some CPH staff members claimed that their own sense of professional responsibility has increased.

"We became more interested and try to receive quality data from the facilities. Similarly, providers try to detect, register and report all infectious disease cases." (CPH epidemiologist)

"Now, more data is available from the facilities, and I became interested to receive the surveillance data and see what will be the result." (CPH epidemiologist)

“We provide feedback on a regular basis to the subordinate healthcare facilities on every single mistake and uncertainty detected in the submitted reports. Often they are surprised about such detailed checking from our side but I would say that it works.” (CPH epidemiologist)

The continuous trainings and availability of standard forms and guidelines were cited as factors that led to improved knowledge about current regulations both at rayon CPH and facility level. Many respondents mentioned that clear guidelines and instructions were given during the training, and this made their routine work easier to perform.

“District doctors realized and currently are aware of their own responsibilities and functions. They know now that they have to submit the data to the CPH offices. District level trainings have contributed to that.” (CPH epidemiologist)

“Nobody can say today that guidelines are unavailable. All providers have their own copies of the guideline on their working tables. They only have to take the guideline and read it carefully.” (CPH epidemiologist)

“Our routine tasks and responsibilities for case registration and reporting have been clearly defined.” (CPH epidemiologist)

“In case of infectious disease case, I always refer to the guidelines and I am guaranteed that I do not forget or miss anything” (CPH epidemiologist)

“Everything is available, guidelines, forms, workbooks . . . Our work has been simplified significantly.” (CPH epidemiologist)

Apart from intervention activities, two external factors were mentioned contributing to the increased number of registered cases in the rayons: the increased timeliness of salaries paid by the government and the measles epidemic that occurred during much of 2004.

“Even though ambulatories are not our subordinate facilities, the quality of submitted data has been improved, due to financial motivation (no delays in salaries) and increased responsibility.” (CPH epidemiologist)

“This kind of Measles epidemic we never encountered before. Due to a high number of cases among adults and frequent complications, more patients seek care at health care facilities.” (CPH epidemiologist)

Remaining barriers: Respondents mentioned that a number of barriers remain that affect the availability of quality surveillance data. Among the barriers that CPH heads and epidemiologists mentioned are the following factors:

- ▲ Poor communication
- ▲ Weak and non-functional linkages between CPH and health care facilities
- ▲ Low priority that rayon governments place on surveillance carried out by CPH staff
- ▲ Lack of motivation/low salaries
- ▲ Lack of transport and fuel

- ▲ Lack of physicians in rural areas
- ▲ Poor reporting from private practitioners and some public providers
- ▲ Low utilization of health care services which leads to underreporting of VPD cases in the community

Communication: Respondents mentioned that while the ability to use phones to report data has improved substantially in urban areas, communication remains a critical problem in mountainous and remote areas. Not all facilities have landline phones at their offices. Many providers and epidemiologists rely on their own mobile phones, although not all staff have them, especially in rural areas. Due to a lack of means of communication, a substantial number of notifications are submitted with delay from rural areas.

“Problem of communication between village ambulatories and rayon CPHs still remains unchanged. This problem is especially critical for remote and high mountainous villages. Due to this reason number of cases are still notified with delay.” (polyclinic provider)

“For example, in Kharagauli rayon, completeness and accuracy are more improved rather than timeliness due to the problems of communication (lack of communication means at ambulatory levels).” (CPH epidemiologist)

Linkages between CPH and health care facilities: CPH epidemiologists cited the weak functional linkages between CPH offices and health care facilities as a key obstacle preventing the reporting of infectious disease data. They mentioned that they have no legal authority over health care providers, an issue that remains unresolved after the intervention.³ Unlike the situation that existed in the communist era, CPH staff lack the ability to impose penalties if government facility do not submit surveillance data according to the guidelines. Losing authority over the facilities has had a negative impact on the providers’ sense of responsibility as they have realized that no one from CPH offices could impose any penalty on them if they perform poorly.

“Health facility network is not under our control. While dealing with the providers we use personal contacts only.” (CPH epidemiologist)

“Our only recourse is to inform the Ministry of Health on poorly performing facilities, which in turn should ask the Ministry of State Property Management to take appropriate measures.” (CPH epidemiologist)

“There are no penalties for those who do not report the surveillance data. We are limited.” (CPH epidemiologist)

Remuneration: Many epidemiologists also mentioned that there is low motivation to report and gather surveillance data, and that remuneration is the primary factor influencing motivation. It should be stressed that both CPH staff and primary care providers have not received any raises in recent

³ As part of the health care reforms, health care facilities (ambulatories, polyclinics, and hospitals) became independent legal entities (LTDs or Joint Stock Companies) and were not responsible for reporting directly to CPH offices. This was partly compensated that CPH was assigned the task to manage different public health programs that involved financial management and supervision of facilities. However, in 2004, management of the programs was shifted to the United Social Insurance Fund.

years. However, unlike the situation in 2003, they are now paid on a timely basis. Respondents mentioned that the issue of low salaries continues to be an important problem.

“Financial motivation is essential. Due to the low salaries providers sometimes do not perform their routine work perfectly.” (CPH epidemiologist)

While some respondents viewed salary as important, some mentioned the opposing view that motivation is driven by the sense of responsibility rather than by salary levels.

“Performance of the person with sense of responsibility will be satisfactory regardless of financial motivation.” (CPH epidemiologist)

“When a person is indifferent, nothing works for him/her as motivation.” (CPH epidemiologist)

Priority on surveillance activities from local government: CPH offices depend on local governments as a source of financial support. Although local governments are required to contribute 1.5 percent of their budgets for public health, some participants mentioned that local governments have a poor understanding of the importance of VPD surveillance activities, and this has affected their work.

“I have to explain them who we are and why our service is important for the population.” (CPH epidemiologist)

Low levels of health care utilization: Another critical factor that affects the reporting of surveillance data is low levels of health care utilization. Many of those who suffer from health care problems opt either to self-treat, to seek treatment from a traditional healer, or to delay seeking treatment from a professional health care provider. This leads to under-reporting of infectious surveillance cases.

“People usually do not seek care at official facilities due to the financial problems, thus significant number of cases are not registered.” (CPH epidemiologist)

“To my opinion the problem is in the parents’ attitude. In general they go directly to the traditional healers in case of hepatitis cases in order to hide the revealing the illness.” (polyclinic provider)

Under-reporting from private providers: Respondents also mentioned that private practitioners seldom report cases of infectious diseases, commenting that:

“Majority of private practitioners does not assume responsibility to notify the data to the CPH.” (CPH epidemiologist)

“All private facilities are informed about current regulations; although there might be some more private facilities/laboratories we do not even know exist in our rayon. Even those private facilities I have trained/instructed, do not always notify.” (CPH epidemiologist)

“Even those private providers I have trained do not notify cases.” (CPH epidemiologist)

Some providers also claimed that there is an under-reporting of cases from some government facilities. Respondents mentioned that cases detected by hospital doctors were less likely to be registered and notified compared with those seen by polyclinic doctors.

“They do not feel themselves as a part of overall IDS reporting/surveillance system and training need to be carried out for them as well.” (polyclinic provider)

5.2.2 Analysis of Surveillance Data

Changes during the intervention period: CPH epidemiologists participating in the FGDs mentioned that, since the introduction of the intervention, they more frequently and more thoroughly analyze VPD surveillance data than prior to the intervention. The workbook is used by almost all epidemiologists to prepare statistical reports, and epidemiologists mentioned that the data aggregation section is used more frequently rather than the logical conclusions sections.

Factors that affected the effectiveness of the intervention: A number of factors were mentioned by CPH epidemiologists to explain why the analysis of data improved during the intervention period. These included the following:

- ▲ Increased reporting of quality data from subordinate health care facilities
- ▲ Availability of written guidelines
- ▲ Availability of workbook and improved analytical skills
- ▲ Improved motivation
- ▲ Availability of financing for outbreak investigations

Increased reporting of quality of data: Before the intervention, there were insufficient data submitted to CPH offices from the facilities. CPH staff did not consider the analyses as an important tool for assessing the VPD situation and preparing responses. Nevertheless simple analysis based on conjuncture was usually performed at the end of each year. After the intervention, the increased volume of better quality data from health facilities made it possible for the epidemiologists to carry out analysis routinely.

“The increased number of cases creates the basis for proper analysis; however quality of data still remains a problem.” (CPH epidemiologist)

Availability of written guidelines: Some respondents mentioned that, prior to the intervention, guidelines for analyses were not available at the rayon level. Others mentioned that the guidelines were available, but that they were not helpful in answering their questions on how to go about carrying out analysis. Before the intervention, CPH epidemiologists used to do only basic analysis limited to case aggregation by place, age, and time (according to the governmental decree #306).

With the new guidelines and workbook, and the improved reporting of data from health care facilities, epidemiologists mentioned that they are now better equipped to perform their analysis function.

Availability of workbook and improved analytical skills: CPH directors mentioned that all epidemiologists know how to analyze the data after they graduate from the medical university, but that staff epidemiologists think that they have improved their skills as a result of the intervention, and that the introduction of the workbook has been very helpful in this regard. The workbook was mentioned as a most useful tool to improve skills to analyze and interpret surveillance data.

“Six months ago I was not capable to undertake this kind of analysis. Now I know. If I have any doubts I can always refer to the guidelines.” (CPH epidemiologist)

“The analysis I was doing before was superficial, while the analysis I am currently performing is deeper and systematic. You know every step to take from reporting to analysis. The provided guidelines are comprehensive.” (CPH epidemiologist)

However, in the second follow-up survey, respondents in the CPH directors’ group noted that there is a need for further training in analysis skills. According to the directors, not all epidemiologists are equipped with the necessary knowledge and skills to perform analysis tasks at a sufficient level. They expressed willingness to receive more focused trainings in this area. The problem was mentioned as especially critical for new CPH employees.

“Analysis of surveillance data is the weakest point of overall IDSR system.” (CPH director)

“I think that additional trainings are needed in this area for CPH epidemiologists. The trainings they have already received were very helpful and important. However, the need in additional training is evident.” (CPH director)

Improved motivation: Prior to the intervention, many epidemiologists explained that their motivation to carry out analysis was low. With the availability of the workbook as a tool for carrying out comprehensive analysis of surveillance data, their motivation increased. Motivation was also improved by the increasing attention that upper level professionals paid to the analysis results.

“Previously neither my boss, nor others cared much about analysis, now they are more interested in the interpretation of data.” (CPH epidemiologist)

“I am sure that the results of my analysis will be read.” (CPH epidemiologist)

Availability of financing for outbreak investigations: The epidemiologists mentioned that the introduction of financial support for case investigations and monitoring subordinate facilities was a significant motivation factor. CPH directors confirmed that this financial support indirectly influenced all other surveillance activities, including data analysis and reporting.

“Epidemiologists now have more opportunities to visit the outbreak sites and carry out investigations.” (CPH epidemiologist)

Remaining barriers: During the second round of FGDs, respondents mentioned a number of problems that continue to adversely affect the analysis of surveillance data. These include the following:

- ▲ Insufficient availability of quality data
- ▲ Uncertainty that analyses will be used

Insufficient availability of quality data: While health care providers have improved the reporting of surveillance data, many respondents mentioned that the quality of data still remains an obstacle to analysis.

“Quality of data still remains a problem. In particular, private practitioners still violate regulations which affect the quality of data.” (CPH epidemiologist)

“Timeliness needs more improvement rather than accuracy, and that is connected to communication difficulties.” (CPH epidemiologist)

Uncertainty about whether analysis will be used: Some CPH epidemiologists mentioned that using the workbook increased their motivation and that there was increased interest from upper level professionals in the results of analysis they do. However, many epidemiologists mentioned that the results of analysis are not used to prepare and carry out appropriate response actions.

“Results of the analysis are not followed by appropriate response actions.” (CPH epidemiologist)

“I am sure that the results of my analysis will be read by those at higher levels, but not sure that it will be followed by the proper response actions.” (CPH epidemiologist)

“I have submitted results of analysis to my director but I did not have resources to undertake any response action. Now results of my analysis are on the table of my CPH director and I do not know whether it was used or not in fact. This situation has negative influenced my motivation.” (CPH epidemiologist)

“During the epidemics we have investigated lots of cases, however it seems that there was no response action carried out to prevent this.” (CPH epidemiologist)

5.2.3 Use of Analyzed Surveillance Data

Changes during the intervention period: According to the results of the second round of FGDs with CPH heads and epidemiologists, the general use of surveillance data and analysis for planning and decision making is limited. However, almost all respondents mentioned that they have mainly used VPD data analysis to identify insufficiencies of healthcare facilities and give instructions to them. CPH staff mentioned that they perform such analyses in the workbook and make only verbal recommendations to the providers. These recommendations are not documented anywhere except in the workbook, but comments made during the FGDs of health care providers support this conclusion.

“I have intensive contact with CPH epidemiologists in my rayon.” (polyclinic provider)

“There is regular feedback, epidemiologists inform us about epidemiological situation, and the feedback is more intense with regard to immunization.” (polyclinic provider)
“We are provided with comparative analysis between rayons from CPH.” (polyclinic provider)

“Their (CPH) supervision is more supportive rather than punitive and that makes it effective.” (polyclinic provider)

Most respondents (polyclinic providers and directors) stressed that feedback from the upper levels (rayon CPH) has improved. The supportive nature of supervision is appreciated and considered more effective than old punitive visits.

Factors that affected the effectiveness of the intervention: CPH epidemiologists and directors at the rayon level mentioned that, in contrast to the NCDC, regional CPHs always provided regular feedback to them. Furthermore, this feedback from the regional CPH office became more frequent during the course of the intervention, and this has been instrumental in making better and more frequent use of surveillance data to oversee the activities of subordinate health care facilities.

“We have close and regular contact with regional CPH.” (CPH epidemiologist)

“They always inform us about all news and problems existing in the overall system. Thank to them we always are aware about general situation with regard of surveillance system not only in the rayon, but in the whole country.” (CPH epidemiologist)

However, some epidemiologists pointed out that there was no training on how to use surveillance data.

“Meetings are organized once per month by CPH, and representatives from all facilities attend it, where we discuss all problematic issues.” (CPH epidemiologist)

“This happens in some rayons, while in other rayons such meetings are not organized on a regular basis.” (CPH epidemiologist)

The common practice is for epidemiologists to provide advice and instructions at the time surveillance data are submitted by the facilities.

“Providers mostly receive instructions individually.” (CPH epidemiologist)

Remaining barriers: CPH heads and staff epidemiologists mentioned a wide variety of problems that affect the use of analyzed surveillance data for planning, management, and decision making. These included the following factors:

- ▲ Limited availability of resources to carry out surveillance response
- ▲ Deterioration of public health functions as a result of health care reforms
- ▲ Limited priority placed on VPD surveillance by local governments

Limited availability of resources: The lack of technical and financial support from the upper levels was considered as a major obstacle with regard to using analyzed surveillance data. CPH directors stressed that lack of financial resources is of greatest concern, as there is no financial support from the local government. The lack of resources was also stressed in the FGDs as a barrier in using the results of analysis of surveillance data. Respondents stressed that the problem still remains, as there are very limited funds and shortages of materials.

“Everything is defined by economic situation. Whatever high quality analysis is done if they are not supported with financial means nothing will happen. Resources are very limited.” (CPH epidemiologist)

“Very often my requests are rejected due to lack of financial resources.” (CPH epidemiologist)

“Main constraining factors with regard to use of surveillance data are limited authority and limited resources.” (CPH epidemiologist)

“Even if cases are reported, no action is taken because of the lack of resources and/or the lack of responsibility from the local government.” (CPH epidemiologist)

“There were 5 Hep A cases in a local school, disinfection was needed, which was not done because there were no funds allocated by the local authorities to purchase needed materials.” (CPH epidemiologist)

Deterioration of public health functions: During the focus group discussion of CPH directors, respondents mentioned that health care reform has significantly limited CPH authority, as individual facilities do not have to report directly to CPH staff, which limits the responsiveness of health care providers to recommendations made by CPH officials. Moreover, CPH offices never receive the full budgets from local governments. As for the central budget, there has been a steady decline in the amount of funding for disease surveillance since the start of the reform in 1995.

“CPH offices have been separated from the sanitary inspection. As a result, they have lost authority as their responsibilities have been cut down.” (CPH director)

Limited priority placed on VPD surveillance by local government: Epidemiologists do not even try to mobilize additional resources for surveillance and response because of frustration resulting from the perceived lack of interest from decision makers at the local government level. For the same reason, there is often no emergency stock of vaccines, drugs, or supplies.

“Only in case of a serious epidemic they (authorities) are concerned and you have more chances to get support.” (CPH epidemiologist)

“Upper levels (authorities) do not consider themselves obligated to provide support.” (CPH epidemiologist)

“Neither local, nor central government expresses interest in surveillance and response.” (CPH epidemiologist)

“We are tired requesting support from the local government, therefore we do not attempt to request any more.” (CPH epidemiologist)

6. Discussion

6.1 Effectiveness of the Intervention Package (Objective 1)

This section summarizes the results of the major themes that are the focus of the study: 1) was the job aid intervention package successfully implemented?; 2) did the expected improvements in analysis and response occur after implementation of the intervention package?; and 3) to what extent did the package of interventions contribute to resultant improvements in analysis and response? Table 15 presents the results for the seven primary indicators that are intended to help answer these questions.

Table 15: Summary Table of Primary Indicators for Measuring Program Effectiveness and Impact

Indicator (outcome)	Means of evaluating effectiveness		
	Comparison group	Assessment method	P-Value*
1. Proportion of CPH staff that agree there are written guidelines to help guide data analysis	Intervention only, Pre-post	Chi-square	<0.01
2. Proportion of CPH staff that agree there are written guidelines to help make use of surveillance data	Intervention only, Pre-post	Chi-square	<0.01
3. Mean score for Likert scale questions measuring perceptions of availability of quality VPD data	Intervention-Control Pre-post	Linear regression	0.09
4. Mean score for Likert scale questions measuring reported level of perceived capability to perform analysis	Intervention-Control Pre-post	Linear regression	<0.01
5. Mean score for Likert scale questions measuring motivation to carry out analysis	Intervention-Control Pre-post	Linear regression	0.03
6. Mean score for Likert scale questions measuring perceived value of using analyzed VPD data	Intervention-Control Pre-post	Linear regression	0.18
7. Mean score for Likert scale questions measuring perceived motivation to use surveillance data	Intervention-Control Pre-post	Linear regression	0.90

*The p-values are for chi-square tests are for interaction terms from linear regressions.

6.1.1 Was the Job Aid Intervention Package Successfully Implemented, and Did it Function as Intended?

The results of both the quantitative survey and the record review show that the intervention was successfully implemented within each of the 12 CPH rayon offices in the intervention region of Imereti. This was evident by the fact that: 1) all rayons had received the surveillance guidelines and job aid; 2) both the guidelines and job aid were readily available; 3) staff from each of the 12 CPH offices had participated in basic training in the use of the surveillance guidelines; 4) almost all CPH staff reported they knew how to use the workbook; and 5) project records showed that the financial

standards system described was implemented as planned. The workbook was revised between follow-up 1 and 2. While the revised workbook was available in all 12 rayons, according to the record review, only half were found to be using the revised version at follow-up 2, with the remaining half using the previous version.

The questionnaire showed that by follow-up 2, all (100 percent) respondents within the intervention rayons agreed that: 1) there are written guidelines to help guide the analysis of the surveillance data (Indicator 1); 2) there are written guidelines to help identify problems with health facilities with prevention and control of VPDs (Indicator 2); and 3) there are written guidelines to help specify solutions for problems with health facilities in the prevention and control of VPDs (also see Figure 5). Furthermore, the two primary indicators for measuring successful implementation of the intervention package, in relation to baseline conditions, showed there was a significant increase between baseline and follow-up 2 in: 1) the proportion of CPH staff that agreed there are written guidelines to help guide the analysis of the surveillance data; and 2) the proportion of CPH staff that agree there are written guidelines to help make use of surveillance data (Table 14).

6.1.2 Did the Expected Improvements in Analysis and Response Occur after Implementation of the Job Aid Intervention Package?

There is substantial evidence from the survey questionnaire, record review, and FGDs that many expected improvements in analysis and response did occur following implementation of the intervention package. First, the survey results showed a marked increase from baseline in the perceived availability of quality surveillance data by CPH staff (Table 2). This was largely substantiated by the FGDs where CPH heads and staff epidemiologists stressed that completeness, timeliness, and accuracy of data from subordinate health facilities had significantly improved since the introduction of the intervention package.

Second, the questionnaire showed a marked increase from baseline in the proportion of CPH staff that perceived themselves capable of performing analysis of surveillance data (Table 4). This was largely substantiated by the FGDs and by the fact that CPH epidemiologists cited that there has been improved understanding of their roles, job functions, and regulations since the introduction of the intervention package. Furthermore, CPH directors cited that they perceive CPH epidemiologists to have improved their analytic skills since the introduction of the intervention package.

Third, the questionnaire showed a marked increase from baseline in the level of self-reported CPH staff motivation to analyze surveillance data since baseline (Table 6). The FGDs again largely affirm these results. Many epidemiologists explained in the focus group discussion that, prior to the intervention, their motivation to analyze surveillance data was low, and that since then, their motivation for such tasks has increased.

Lastly, there was a modest increase in the level of self-reported motivation by CPH staff to use analyzed surveillance data since baseline (Table 11). Furthermore, the record review showed that analyzed data were being used since the introduction of the intervention package, with 9 of 12 CPH representatives able to show statistical reports that were generated, and 10 of 12 showing analytical reports on the epidemiological situation, performance, planning and/or implementation actions undertaken as a result of the workbook. However, while the questionnaire showed that the perceived value CPH staff placed on using analyzed surveillance data was very high at baseline and continued that way over both follow-up survey rounds (Table 9), this high value did not necessarily translate into action (conducting all IDSR activities in a timely and accurate manner). According to the CPH heads and staff epidemiologists, the general use of surveillance data and analysis for planning and

decision making is limited, although self-reported measures for using surveillance information for a number of types of actions were high. Furthermore, motivation to use analyzed data appeared to be tempered by the following barriers: limited availability of resources to carry out surveillance response, deterioration of public health functions as a result of health care reform, and limited priority placed on VPD surveillance by local governments.

Despite these improvements, the results of the record review suggest that the workbook was not used to its fullest extent for data analysis and evidence-based decision making (use). This was evident by the fact that on average, nearly a quarter (22.5 percent) of the workbook sections focused on data aggregation (analysis) were not completed in 2004, and 50 percent, on average, were not completed accurately in 2004. Furthermore, the record review showed that the majority (64.2 percent) of the workbook sections focused on data use, as defined by making data-driven recommendations, were not completed in 2004, despite the fact that, during this period, all districts were experiencing a measles outbreak. While there may have been sufficient training in basic surveillance and epidemiology, additional training in using the workbooks for analysis and evidence-based decision making may be in order.

The results from respondents from the control areas also warrant attention, as it is interesting to note that the baseline values for some indicators on staff perceptions were found to be higher, on average, among control respondents than among intervention respondents. For example, control respondents were more likely to agree with the statements that there are written guidelines available to help guide the analysis of surveillance data and to identify problems and solutions at the health facility level, and they have sufficient capacity to perform analysis and response of surveillance data. One explanation for these findings is that, prior to the baseline survey, selected CPH staff in the intervention areas participated in a training session on epidemiology and health information systems. This may have led intervention participants to realize that the guidelines that they were using at the time were inadequate compared to the guidelines that were introduced as part of the intervention, and that they did not have the sufficient skills necessary to conduct data analysis. This explanation is supported by the results of the FGDs, in which some participants explained that, prior to the intervention, the available guidelines were not helpful in carrying out data analysis, that their data analysis skills were very limited, and that the types of analysis that were conducted were often superficial. It is also interesting to note that, among control respondents, the outcome levels of many of the outcome indicators measured with the survey data decreased over time. The explanation is unclear, but one possibility is that the respondents realized that they did not have the guidelines and skills necessary to carry out all the functions that were brought up in the questionnaire.

6.1.3 To What Extent Did the Package of Interventions Contribute to Resultant Improvements in Analysis and Response?

There is evidence to suggest that at least some of the improvements in analysis and response observed within the intervention rayons were attributable to the intervention package. Such program attribution to improvements in outcome indicators was tested by the use of a pre-post quasi-experimental design (Figure 3). Using this method, program impact was assessed by desired improvements in specified outcome indicators among the intervention group in relation to the control group, which showed what would have happened had the intervention package not been implemented. In this way, impact was assessed using linear regression (illustrative example provided in Figure 4), with the covariate of interest being the interaction term between treatment groups (intervention vs. control) and study time points (baseline vs. follow-up 2), the results of which are summarized in Table 14.

For all impact outcome indicators (3-7 in Table 15), all coefficients were in desired directions indicating that the improvements in respective aspects of analysis and response, as measured by the mean Likert scale scores, were greater in the intervention rayons than in the control rayons. Overall, the evaluation showed the intervention package to have had a substantial impact on improving analysis of surveillance data, while having only a very limited impact on use of surveillance data. The intervention package was shown to have had a significant impact ($P < 0.05$) on two areas of analysis in particular, perceived capacity to perform analysis (Indicator 4) and motivation to perform analysis (Indicator 5). Additionally, the intervention package was shown to have had a marginally significant impact ($P = 0.09$) on the perceived availability of quality surveillance data. However, statistical analyses showed no significant impact of the intervention package on the two aspects of data use that were measured, perceived value of using analyzed surveillance data (Indicator 6) and perceived motivation to use analyzed surveillance data (Indicator 7), which may be explained partially by the fact that their values were already high at the time of the baseline survey.

The results of the impact evaluation should be treated with caution for several reasons. First, limitations in sample size greatly limited statistical power and thus there is a chance that desired changes in outcome measures of data use were not detected. Secondly, the intervention package was implemented within the Imereti region as a full coverage program; rayons were not randomly assigned to intervention and control groups, which limits the internal validity of the study design. While every effort was made to match control rayons in terms of motivation, performance, location (mountainous vs. flat), and population density (by age and sex), there is potential for selection bias where intervention rayons may have been better suited to improve in analysis and response due to factors other than the intervention package itself. Third, the questionnaire relied on self-reported responses which may have been subject to social desirability bias. This may explain why no statistical impact was detected for the indicator measuring self-reported motivation to use analyzed surveillance data, which was very high at baseline within both the intervention and control groups, and continued to be high in both follow-up survey rounds. In this instance, it is likely that the results were biased towards the null hypothesis of no change. Fourth, this operations research was not sufficiently designed to quantify to what extent each component of the intervention package contributed to improvements in analysis and response. Finally, aspects of analysis and response were very difficult to measure in the absence of a proven gold standard method. Thus, lack of changes, or detected changes, in various aspects of analysis and response may have been due to limitations in the measurement tools used.

6.2 In-depth Assessment of Factors that Affect Effectiveness of the Intervention Package (Objective 2)

The results of the FGDs of CPH and health care facility staff point to a number of factors that help explain the degree of above-mentioned rayon-level improvements in the intervention area. First, respondents mentioned that specific components of the intervention – the continuous trainings and technical assistance and availability of the guidelines – led to improved knowledge about current regulations at both the local- and health-facility levels, clarification of the roles and responsibilities of staff at regional, rayon, and health facility levels, and as a result, improved availability and analysis of data. The workbook was also mentioned as a factor that helped clarify the types of analysis that should be carried out, and how the analyzed data should be used for epidemiological and programmatic response. At the same time, CPH staff directors claimed that more training in analytical skills is needed, especially for newly hired staff. Second, many staff at both the CPH and health facility level described that the intervention has led to an increased sense of job responsibility regarding their role in the surveillance system, and as a result, better performance. That the CPH at the regional and local level were paying greater attention to surveillance data was mentioned as a

reason for the improvements in data availability and analysis. Third, the financial standards component of the intervention, which provided a new source of financing for CPH staff to investigate outbreaks and to monitor subordinate CPH offices and health care facilities, was mentioned as a factor that increased the ability of CPH staff to carry out critical surveillance functions. Prior to the intervention, the non-personnel costs of outbreak investigations and monitoring were largely unfunded, which is a legacy of the health reforms that were initiated in 1995. Finally, two factors outside the scope of the intervention may also have played a role in the improvements: increased staff motivation that resulted from the regularity of the payments of salaries in 2004 compared to the situation in 2003, a year in which there were many months when CPH and health facilities staff did not receive payments, and the measles epidemic that occurred during much of 2004.

Despite these improvements, the FGDs with CPH staff highlight several potential barriers to using the intervention tools to their fullest extent for analysis and response. First, while the situation has improved, CPH staff still cited there was insufficient availability of quality surveillance data from subordinate health facilities. The unavailability of phones and electricity in health facilities and CPH offices, low levels of health care utilization, and poor reporting of data from some private providers also play a role in limiting the availability and quality of surveillance data. Second, there appears to be a common perception that even if surveillance data are analyzed (or aggregated), they will likely not be used by those at higher levels. Third, the CPH staff frequently expressed the fact that they had no authority to impose penalties on low-performing health facilities, no matter how poorly they carried out their surveillance duties. Fourth, limitations of government resources to carry out surveillance responses were frequently cited as a reason for why analysis is not used to carry out prevention and control responses. And lastly, low salaries were cited as a reason why some CPH staff were not always motivated to perform their surveillance tasks adequately.

All of these factors suggest that, although the intervention package was implemented successfully, external factors, particularly those that operate at the health systems level, played an important role in limiting its effectiveness in enhancing data analysis and response. A large part of the problem is that accountability relationships within Georgia's health system are often weak. For example, the health reforms that were carried out in the 1990s resulted in fragmentation between health care facilities and CPH offices and a lack of clarity about who is financially responsible for some key functions of the surveillance and response system, such as outbreak investigations. In order to address the health systems factors that act as barriers in Georgia, it will be critical to identify and assess the various accountability roles that actors in the surveillance and response system play (Brinkerhoff 2003). Three types of questions should be considered in order to improve the situation: who is accountable for implementing and for financing the various functions and to whom are they accountable. Answering these types of questions will be essential in order to develop strategies and reforms that will help ensure the maximum effectiveness of the intervention package in promoting evidence-based decision making, especially as it is rolled out across the country.

It should be noted that preliminary results of the present study have already been used to provide assistance to the government of Georgia to roll out the intervention package to the rest of Georgia. Moreover, the results have served as potent tool by the government in efforts to further strengthen VPD surveillance and response activities. First, *PHRplus* is collaborating with the government in drafting a new public health law. The pending law would improve the organization and management of public health services by defining core public health functions, and making clear the roles and responsibilities of all stakeholders in carrying out these functions. The law would also clarify the financial responsibilities of central and rayonal government levels to ensure timely and efficient implementation of the aforementioned functions including VPD surveillance and response. The second major activity, which was also triggered by the results of this study, is to help the government

by making projections of the amount of resources that are needed for the reformed system for surveillance and response to VPDs and identify financial mechanisms for the reformed system.

7. Conclusions

- ▲ All components of the intervention package, including the guidelines, job aid workbook, training, and financial standards, were successfully implemented in the intervention rayons primarily as intended.
- ▲ Many expected improvements in analysis and response did occur following implementation of the intervention package, as indicated by measured improvements in:
 - △ The perceived availability of quality surveillance data by CPH staff
 - △ The proportion of CPH staff who perceived themselves capable of performing analysis of surveillance data
 - △ The level of self-reported CPH staff motivation to analyze surveillance data
 - △ The use of analyzed data to prepare statistical reports and to make recommendations on improving surveillance and response activities
- ▲ There is evidence to suggest that at least some of the measured improvements in analysis and response were attributable to the intervention package, as assessed by the use of a pre-post quasi-experimental design.
- ▲ Despite these improvements, the results suggest that the tools that make up the intervention package were not used to their fullest extent for data analysis and evidence-based decision making, as evidenced by the finding that many types of expected analyses were not carried out, and that there was little evidence that analyzed data were used to carry out prevention and control actions.
- ▲ There exist several barriers that operate at the health systems level that adversely affected the effectiveness of the intervention in influencing the availability of data, analysis, and response. Addressing health systems barriers will be critical to ensure the maximum effectiveness of the intervention package in promoting evidence-based decision making, especially as it is rolled out across the rest of Georgia.
- ▲ Health systems barriers are also likely to play important roles in other countries. In order to strengthen surveillance and response systems, donors, governments, and other stakeholders should consider whether and how health systems factors might influence investments to improve the availability of data, analysis, and response.

Annex A: Intervention Questionnaire for Follow-up 2

CPH Staff Questionnaire: Intervention Rayons

Follow-up 2 for Assessing Practices, Motivation, and Attitudes regarding

Analysis and Use of Surveillance Data

The objective of this follow-up questionnaire is to help us better understand practices, motivations, beliefs, and attitudes regarding the analysis and use of surveillance data for vaccine-preventable diseases.

This questionnaire is to be completed by each respondent. The questionnaire contains 60 questions that should take approximately 30 minutes to complete. Please answer EVERY question. Instructions for how to respond to the different questionnaires are provided at the beginning of each section. Please note that there are no right or wrong answers, only what YOU think.

Please answer each question as honestly as possible. The purpose of this survey is not simply to assess the current state of analysis and response within each CPH in itself, but rather to ascertain a baseline from which future improvements in analysis and response can be measured.

All the information that you provide in this session will be held in confidentiality by the researchers. Your responses will be aggregated from all interviews so that no one individual will be identifiable. The aggregated information we collect from these interviews will be used to: (1) identify perceived motivations for analyzing and using surveillance data; (2) understand the current level of analysis and response undertaken by your team; (3) understand the perceived value placed on the analysis and use of surveillance data; (4) help us identify perceived barriers to the analysis and use of surveillance data; and (5) assist us in measuring changes in knowledge, attitudes and behaviors related to analysis and response over time.

Please answer each question as honestly as possible. The purpose of this survey is not simply to assess the current state of analysis and response within each CPH in itself, but rather to ascertain a baseline from which future improvements in analysis and response can be measured.

Subject number: ____

Name of Rayon Center for Public Health _____

Background information

What is your current position?

Professional degree holders

- ☐ Director
 - ☐ Deputy director
 - ☐ Epidemiologist
 - ☐ Health Education Expert
 - ☐ Laboratory Physician
 - ☐ Bacteriologist
 - ☐ Virologist
 - ☐ Parasitologist
 - ☐ Statistician
 - ☐ Other type of professional (Please specify below)
- _____

Non-professional degree holders

- ☐ Assistant Parasitologist
- ☐ Laboratory Assistant
- ☐ Instructor / disinfectionist
- ☐ Disinfectionist
- ☐ Health Education Instructor
- ☐ Other (Please specify below)

How many years of experience do you have working in this profession? ____ yrs

1. Are you ____ Male, ____ Female?
2. What is your age? ____ years old
3. How long have you been working for this health office? ____ yrs

For each question below, either write in your answer or put an “X” beside the best response option.

4. How long have you been in your current job? ____ yrs
5. Do you supervise any other workers? ____ Yes ____ No
- If yes:
- Approximately how many workers do you supervise? ____
6. There are ____ subordinate health facilities and ____ labs in my rayon, including ____ private facilities and ____ private labs.
7. Have you previously taken part in this questionnaire? ____ Yes ____ No
- 9a. If yes, how many times? __1 __2

II. Availability of quality surveillance data

Directions (Questions 10-14): Use the scale below to indicate how much you agree or disagree with each statement by placing the number that best corresponds to your answer in the space provided at the end of each question. Remember there is no right or wrong answer, only what is TRUE of you.

1	2	3	4	5
Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree

8. Subordinate health facilities and labs report their surveillance data (urgent notifications and reports) in a timely manner (i.e. by established deadlines). ____
9. Reports submitted by subordinate health facilities are fully completed, as required. ____
10. I have confidence that the surveillance data reported by subordinate health facilities are accurate. ____
11. Private facilities and labs report surveillance data accurately and on time. ____
12. My organization has sufficient authority to enforce subordinate health facility staff to submit timely and accurate surveillance data. ____
13. The primary barriers to receiving quality surveillance data from subordinate health care facilities and providers include: (*Place your level of agreement (1-5) next to each statement*)
- ____ There are no barriers to receiving quality surveillance data from health care facilities and providers. (no further answers required if you answer with a 5) OR
- ____ There is no effective means of communication for health facilities to report surveillance data to CPH.

- ☐ There is no clear format for reporting surveillance data to CPH.
- ☐ Health facilities do not recognize the importance of reporting surveillance data.
- ☐ Health facilities perceive that surveillance data will not be used at higher levels.
- ☐ There is insufficient surveillance data collection at health facilities.
- ☐ The reporting of surveillance data by health facilities is not clearly mandated.
- ☐ There is no penalty for health facilities that do not report surveillance data to CPH.
- ☐ Health facilities do not have the time or resources to report surveillance data.

Other – please specify and briefly explain:

III. Analysis of surveillance data

This section of the questionnaire asks questions regarding the analysis of surveillance data for vaccine preventable diseases. We define data analysis as the process of summarizing and categorizing raw data into a more meaningful and understandable format. In addition to simple desegregation of raw data, data analysis is often used to derive statistics, such as rates, ratios and proportions, from rudimentary data, such as counts of disease cases and population numbers. Examples of data analysis may include the estimation of prevalence, incidence, proportion of facilities with timely reporting, and immunization coverage rates. When you answer the questions in this section, please keep in mind the above definition of analysis of surveillance data.

Directions (Questions 16-25): Please answer the following questions:

16. Are you directly responsible for performing at least some level of analysis of surveillance data?
☐ Yes ☐ No

If no, please answer only those questions from 16-22 that you feel are relevant to you.

17. Has your CPH office received the workbook that is intended to facilitate the analysis and use of VPD surveillance data? ☐ Yes ☐ No ☐ Unknown
 a) If yes, did your CPH office receive the revised version? ☐ Yes ☐ No
 b) Did you find the revised workbook easier to use than the first one? ☐ Yes ☐ No ☐ No difference
18. Approximately how much of your time each month is spent on analyzing surveillance data?
☐ 0% ☐ <1-25% ☐ 25-50% ☐ >50% ☐ Not relevant

19. Currently, the timeliness of case reporting/notification is assessed at this CPH on at least a quarterly basis. ____ Yes ____ No ____ Not relevant
20. Currently, infectious disease morbidity trends are assessed at this CPH on at least a quarterly basis. ____ Yes ____ No ____ Not relevant
21. Currently, immunization coverage rates are calculated at this CPH on at least a quarterly basis. ____ Yes ____ No ____ Not relevant
22. Currently, case-based data for outbreaks are analyzed at this CPH on a routine basis. ____ Yes ____ No ____ Not relevant
23. Currently, there are written guidelines used at my CPH to help guide the analysis of surveillance data. ____ Yes ____ No
- If yes, are such guidelines clear and useful? ____ Yes ____ No
- If yes, are you referring to the workbook that was recently introduced? ____ Yes ____ No
24. Currently, there are written guidelines used at my CPH to help me identify problems with health facilities in prevention and control of vaccine preventable diseases. ____ Yes ____ No
- If yes, are such guidelines clear and useful? ____ Yes ____ No
- If yes, are you referring to the VPD surveillance guidelines that were recently introduced? ____ Yes ____ No
25. Currently, there are written guidelines used at my CPH to help me specify solutions to problems with prevention and control of vaccine preventable diseases at subordinate health facilities. ____ Yes ____ No
- If yes, are such guidelines clear and useful? ____ Yes ____ No
- If yes, are you referring to the VPD surveillance guidelines that were recently introduced? ____ Yes ____ No

Directions (Questions 26-34): Use the scale below to indicate how much you agree or disagree with each statement by placing the number that best corresponds to your answer in the space provided at the end of each question. Remember there is no right or wrong answer, only what is TRUE of you.

1	2	3	4	5
Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree

26. The revised workbook is currently used at this CPH to help with analyzing VPD data. ____
 ____ This CPH has no such workbook
- a) If you are using the revised workbook, do you find it easier to use and more clear than the original workbook? ____ Yes ____ No ____ no difference ____ not applicable

27. The revised workbook has helped facilitate the analysis of VPD at this CPH, in relation to how analysis was previous formatted. ____
 ____ This CPH has no such workbook
28. I feel fully capable of using the workbook as a tool to analyze VPD surveillance data. ____
 ____ This CPH has no such workbook
29. Currently, there is sufficient data from health facilities to allow me to complete the workbook on a quarterly basis. ____
 ____ This CPH has no such workbook
30. I posses sufficient skills to analyze and interpret surveillance data. ____
31. I feel fully capable of carrying out analysis of surveillance data. ____
32. I am very motivated to perform analysis of surveillance data on a regular basis. ____

If you agreed in question 32 (i.e. answer with 4 or 5), the workbook and training has contributed to my motivation to analysis such data. ____

33. No additional training in the analysis of surveillance data is needed for me to successfully do my job. ____

If you answered with a 1 or 2 for question 33, please provide details of what type of training would be most beneficial to you:

34. The primary barriers that prevent you from analyzing surveillance data include:
(Place your level of agreement (1-5) next to each statement)

____ There are no barriers to the analysis of surveillance data (no further answers required if you answer with a 5) OR

- ____ Data from subordinate health facilities are insufficient
- ____ I do not have time to perform analysis
- ____ I am not paid enough to analyze surveillance data
- ____ There is no clear use of such analysis
- ____ I am able to do my job without the analysis of surveillance data
- ____ I do not understand how to perform the analysis of surveillance data
- ____ There is no clear format to guide the analysis of surveillance data

Other, please specify and briefly explain:

Directions (Questions 35-42): Please answer the following questions:

35. Has your motivation to analyze VPD surveillance data improved since the introduction of the workbook and training? ____ Yes ____ No
a) Has your motivation to analyze VPD surveillance data improved since receiving the revised workbook? ____ Yes ____ No

36. I would rather surveillance data be analyzed on a regular basis by someone else. ____ Agree
____ Disagree

37. There is no point in analyzing data from subordinate health facilities because they are of very poor quality. ____ Agree ____ Disagree

38. Some of the surveillance data that subordinate health facilities report (or are supposed to report) are not of sufficient quality to allow for the required level of data analysis. ____ Agree
____ Disagree

Please provide 1 or 2 examples if you agree:

-
-
39. I frequently wonder why I am required to do some of the analyses I do. ____ Agree
____ Disagree

40. Some data that I am responsible for analyzing are not useful to me. ____ Agree ____ Disagree

41. Much of the analysis I do is not used. ____ Agree ____ Disagree

42. For YOU, what is the primary source of motivation for performing analysis of surveillance data?
(Please mark with an "X" only the one you most agree with)

____ Money / salary

____ Responsibility of job

____ To improve the surveillance of vaccine preventable diseases in my Rayon

____ I do not have motivation to analyze surveillance data

____ Other (please specify and briefly explain in the space below):

IV. Use and perceived value of the surveillance data

This section of the questionnaire asks questions on the use of surveillance data. The use of surveillance data is defined here as the reliance on analyzed surveillance data to make informed decisions about the prevention and control of vaccine-preventable diseases. Possible uses of surveillance data may include: targeting case/outbreak control measures; guiding campaigns to protect populations at risk; and making recommendations to subordinate health facilities on ways their performance may be improved. When you answer questions in this section, please keep in mind the above definition of use of surveillance data.

Directions (Questions 43-50): Please answer the following questions:

43. Are you directly responsible for making use of the analyzed surveillance data for the prevention and control of infectious diseases? ☐ Yes ☐ No
44. Has your CPH office mobilized any additional funding or resources for the prevention / control of VPD from the municipal or higher levels to act on any recommendations resulting from the analysis performed with the workbook? ☐ Yes ☐ No ☐ This CPH has no such workbook
45. Has your motivation to use analyzed VPD surveillance data improved since the introduction of the workbook and training? ☐ Yes ☐ No ☐ This CPH has no such workbook / training
- a) Has your motivation to use analyzed VPD surveillance data improved since the introduction of the revised workbook? ☐ Yes ☐ No
46. Do you have written instructions or an established plan for responding to cases and/or outbreaks of vaccine-preventable diseases? ☐ Yes ☐ No
- If yes, are you referring to the VPD surveillance guidelines that were recently introduced?
☐ Yes ☐ No
47. Do you have written instructions on how surveillance data could be used by your CPH?
☐ Yes ☐ No
- If yes, are you referring to the VPD surveillance guidelines that were recently introduced?
☐ Yes ☐ No
48. It should be someone else's responsibility to interpret and use the data I analyze. ☐ Agree ☐ Disagree
49. I would rather recommendations for guiding public health responses, and/or for improving the surveillance system, be made by someone else. ☐ Agree ☐ Disagree
50. What is your primary source of motivation for using surveillance data?
(Please mark with an "X" only the one you most agree with)

- ____ Money / salary
- ____ Responsibility of job
- ____ To improve the surveillance of vaccine preventable diseases in my Rayon
- ____ To reduce the problem of vaccine preventable diseases in my Rayon
- ____ I do not have motivation to use surveillance data
- ____ Other, please specify and briefly explain:
- _____
- _____

Directions (Questions 51-60): Use the scale below to indicate how much you agree or disagree with each statement by placing the number that best corresponds to your answer in the space provided next to each question. Please follow other specific directions for each question when given. Remember there is no right or wrong answer, only what is TRUE of you.

1	2	3	4	5
Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree

51. The revised workbook in its current format has contributed to the use of surveillance data as an input into priority setting and planning. ____ This CPH has no such workbook
52. Epidemiological data are essential for providing effective surveillance of vaccine-preventable diseases in my rayon ____
53. Data from subordinate health facilities must be analyzed in order to be useful. ____
54. I place great importance on providing feedback to subordinate health facilities based on the data that I routinely analyze. ____
55. Analysis of surveillance data is useful because it provides a basis for decision making. ____
56. It is important that decisions regarding prevention and control of infectious diseases be based on solid evidence. ____
57. I am very motivated to use analyzed surveillance data to improve prevention and control of infectious diseases and/or to improve the functioning of the surveillance system. ____
- If you agreed in question 57 (i.e. answer with 4 or 5), the workbook and training has contributed to my motivation to use analyzed surveillance data. ____
58. Currently, surveillance data are ROUTINELY USED by my CPH to:
(Place your level of agreement (1-5) next to each statement)

- ☐ Identify insufficiencies of health facilities in preventing and controlling VPDs.
 - ☐ Inform subordinate health facilities of their performance.
 - ☐ Make recommendations to subordinate health facilities on ways their performance may be improved.
 - ☐ Carry out special measures or campaigns to protect populations at risk.
 - ☐ Plan case/outbreak control measures.
 - ☐ Mobilize additional resources for surveillance and/or responses.
 - ☐ Implement measures to improve case confirmation.
 - ☐ Plan procurement of supplies or equipment.
 - ☐ Secure emergency reserves of vaccines, drugs and/or supplies.
 - ☐ Optimize existing practices.
 - ☐ Carry out personnel training.
- Other (please specify):

If you answered with a 4 or 5 next any of the above statements under question 38, please provide 1 or 2 illustrative examples below in more detail:

59. Analysis of surveillance data made available by my CPH should be used by the following:
(Place your level of agreement (1-5) next to each statement on the left, then answer Yes/No on the right)

- | | |
|---|--|
| <input type="checkbox"/> Subordinate health facilities | Currently, health facility staff routinely use analysis results to improve their work.
<input type="checkbox"/> Yes <input type="checkbox"/> No |
| <input type="checkbox"/> Households/communities in my Rayon | Currently, households and communities routinely use analysis results to prevent infectious diseases.
<input type="checkbox"/> Yes <input type="checkbox"/> No |
| <input type="checkbox"/> Rayon health administration | Currently, staff at the Rayon health administration routinely use analysis results to improve disease prevention/control in my rayon. <input type="checkbox"/> Yes <input type="checkbox"/> No |

___ Regional CPH/NCDC, and

Currently, regional CPH/NCDC staff routinely use analysis results to improve disease prevention/control in my rayon. ___ Yes ___ No

Other examples add here, and

Currently, they use it. ___ Yes ___ No

Other examples add here, and

Currently, they use it. ___ Yes ___ No

Other examples add here, and

Currently, they use it. ___ Yes ___ No

60. The primary barriers of you using analyzed surveillance data include:
(Place your level of agreement (1-5) next to each statement)

___ There are no barriers to the use of analyzed surveillance data (no further answers required if you answer with a 5) OR

___ The data which is analyzed are not useful to me

___ The data which is analyzed are not useful to others working at this CHP

___ I do not have time to make use of analyzed surveillance data

___ I am not paid enough to use analyzed surveillance data

___ I do not understand how to use analyzed surveillance data

___ There is no clear format for making recommendations based on analyzed surveillance data

___ I do not feel that others will implement my recommendations

___ due to lack of funds

___ due to lack of accountability

Other – please specify and briefly explain:

THANK YOU!

Annex B: Bibliography

- Brinkerhoff, Derick. 2003. Accountability and Health Systems: Overview, Framework, and Strategies. Technical Report No. 018. Bethesda: MD: The Partners for Health Reform*plus* Project, Abt Associates Inc.
- Sauerborn, Rainer, and Theo Lippeveld. 2000. Introduction. In Theo Lippeveld, Rainer Sauerborn, and Claude Bodart, eds. Design and Implementation of Health Information Systems. Geneva: World Health Organization.
- Ministry of Labor, Health and Social Affairs. 2002. Assessment of Vaccine Preventable Disease Surveillance Systems in Georgia. Technical Report No. 028. Bethesda, MD: The Partners for Health Reform*plus* Project, Abt Associates Inc.
- Ministry of Labor, Health and Social Affairs, and National Center for Disease Control. 2004a Workbook for Rayon Centers of Public Health on Surveillance and Control of Vaccine Preventable Diseases. Bethesda, MD: The Partners for Health Reform*plus* Project, Abt Associates Inc.
- Ministry of Labor, Health and Social Affairs, and National Center for Disease Control. 2004b. Surveillance and Control of Communicable Diseases: Guidelines for Public Health Services Georgia. Bethesda, MD: The Partners for Health Reform*plus* Project, Abt Associates, Inc.